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RECONNAISSANCE APPRAISAL OF THE WATER RESOURCES OF THE HENRY MOUNTAINS COAL FIELD WAYNE AND GARFIELD COUNTIES UTAH 1975-1977

by
Harry D. Goode
and
Eric Olson
University of Utah

Prepared for
Water Resources Division
U.S. Geological Survey
in cooperation with
U.S. Bureau of Land Management
Research supported by
U.S. Geological Survey
Department of the Interior
July 1977

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A. Records of springs in the Henry Mountains area

B. Discharge estimates (E) or measurements (M) on selected streams in the Henry Mountains area, 1975-1977

C. Test drilling by AMAX Coal Company, by Conservation Division, U.S. Geological Survey, and for uranium exploration

D. Cross-channel profiles of selected streams that drain the coal basin

E. Grain-size analyses and porosity determinations of surface samples from selected sandstones

F. Birch Creek and its downstream loss of calcium carbonate

ABSTRACT

The Henry Mountains area encompasses about 1500 square miles in Wayne and Garfield Counties, Utah. It is a scoop-shaped structural basin whose deepest part is near the western boundary along the Waterpocket Fold. The rocks of the area range in age from the Permian Cutler to the Cretaceous Mesaverde and in many places are covered by extensive pediment gravels, stream deposits, and eolian sand of Quaternary age. The structural basin of Laramide age was intruded in Oligocene time by stocks and laccoliths of diorite porphyry which domed up the central part of the basin and formed a subsidiary basin, the coal basin, between the Waterpocket Fold on the west and the intrusive mountains on the east. The Cretaceous Ferron, Emery, and Mesaverde Sandstones of the coal basin contain the principal coal deposits.

Water demand to develop the coal of the area will depend on the way and rate the coal is developed, and may range from 10,000 to 45,000 acre-feet per year for a gasification plant to as little as 7500 acre-feet per year for shipping ten million tons of coal a year by pipeline. Water for such development is probably available only from the Navajo Sandstone, which may contain 50,000 acre-feet per square mile in storage. Under much of the coal-bearing area the Navajo is 4000 to nearly 6000 feet deep but its water may be under artesian pressure of 2000 or more feet. With properly spaced wells the Navajo probably can supply 20,000 to 30,000 acre-feet per year. Other sources that could supply small quantities of water that likely would be drastically reduced during drought years are: springs and streams from the mountains, perhaps 200 acre-feet per year; and Oak Creek or Pleasant Creek, perhaps 1000 to 2000 acre-feet per year. Some of the sandstone units that lie above the Navajo might yield quantities of a few hundred to a few thousand acre-feet per year. These include the Entrada, Morrison, Dakota, Ferron, Emery, and Mesaverde. All except the Entrada, which is known to yield a few tens of gallons per well near Hanksville, are untested as aquifers, but the geologic structure is favorable for storing the meagre recharge into these units so they are worthy of exploration for small supplies.

The work that led to this report was financed by the U.S. Geological Survey through Grant No. 14-08-001-G-218 to the University of Utah, and covered a period of 26 months, from June 1, 1975 to July 31, 1977.

In addition to its conclusion that the Navajo is the best probable source for large quantities of water, this report contains schedules of 209 springs and chemical analyses of 61 samples of spring water, of 11 samples of stream water, and of 24 samples of well water. It also contains the results of grain-size analyses and porosity determinations of 11 samples of sandstone collected from surface exposures, measurements or estimates of flow of many streams, and 16 cross-channel profiles of streams that drain the coal basin.

INTRODUCTION

Location

The Henry Mountains area encompasses about 1500 square miles in Wayne and Garfield Counties, Utah (fig. 1). It is bounded on the southwest and west by the Waterpocket Fold, on the north by the Fremont River, and on the east and southeast by the Dirty Devil River and Lake Powell. In plan view the area is an asymmetric oval with its long axis north-south and with a rather narrow point at the south end where the Waterpocket Fold meets Lake Powell. The three highest peaks of the range, from north to south Mt. Ellen, Mt. Pennell, and Mt. Hillers, are all about 11,000 feet high and roughly bisect the area. The two lower mountains, Ellsworth and Holmes, are southeast of the main peaks and are about 8,000 feet high.

The principal deposits of the Henry mountains coal field lie in a structural basin (here called the coal basin to distinguish it from the larger Henry Mountains structural basin of which it is a part) west of the Henry Mountains in Wayne and Garfield Counties, Utah (figs. 3 and 4). The coal occurs in three zones: the lowest coal zone is in the Ferron Sandstone member of the Mancos Shale, and two, a lower and upper, are in the Emery Sandstone member of the Mancos Shale. Minor amounts of coal also occur in the Dakota Sandstone. The coal beds are exposed around the sides of the mesas and occur in the subsurface in Ts. 29 and 30 S., Rs. 8, 9, and 10 E. in Wayne County and in Ts. 31, 32, 33, and 34 S., Rs. 8, 9, 10, and 11 E., in Garfield County. The deposits of Emery coal most convenient for development are in Ts. 31, 32, & 33 S., Rs. 8 and 9 E., in Garfield County, in the vicinity of Wildcat and Tarantula Mesas.

Purpose and Scope

This project, funded by the U.S. Geological Survey through Grant No. 14-08-0001-G-218 to the University of Utah, was set up to make a reconnaissance evaluation of the water resources of the Henry Mountains area with respect to their potential to supply water to develop the coal

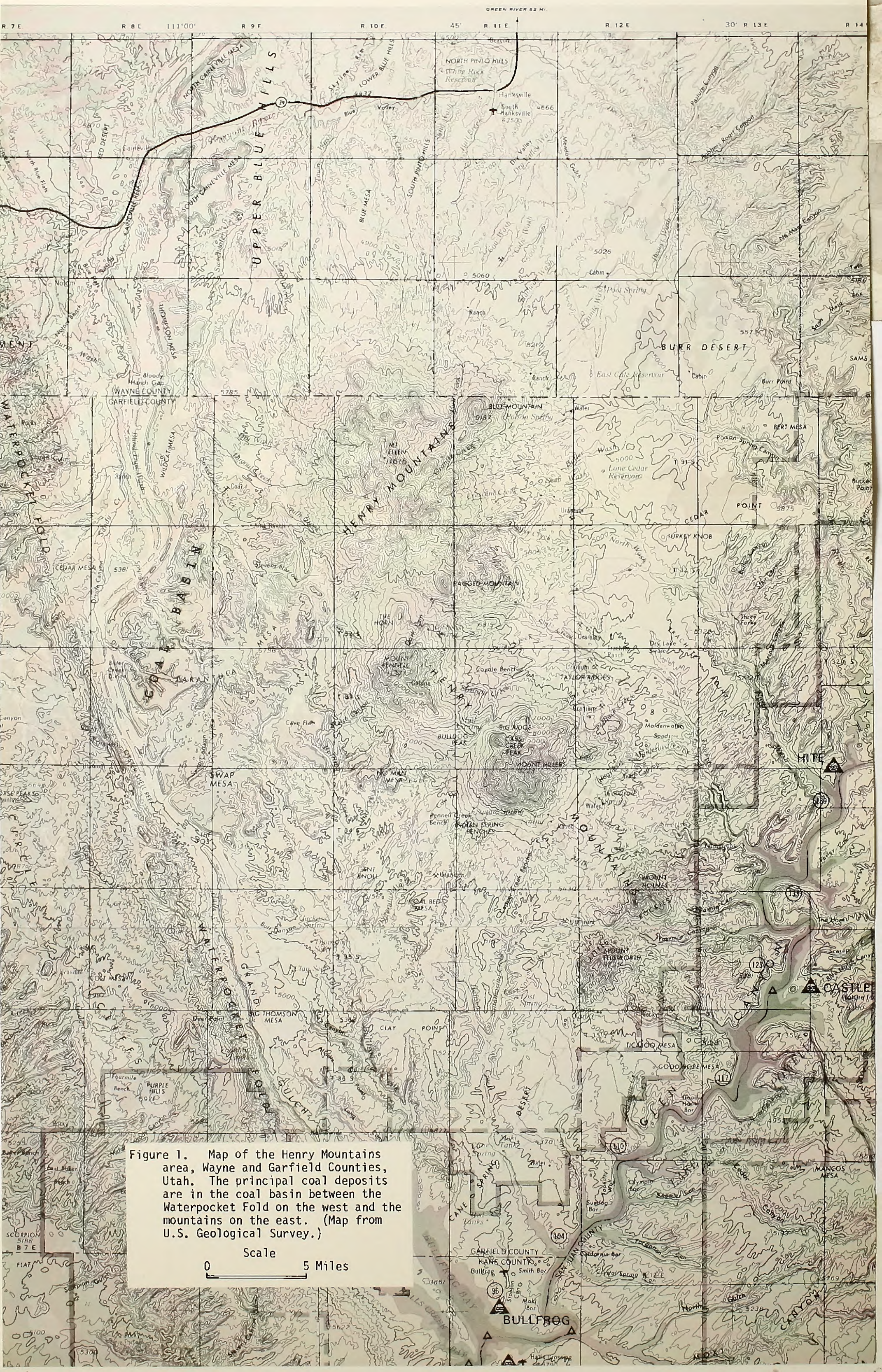

Figure 1. Map of the Henry Mountains area, Wayne and Garfield Counties, Utah. The principal coal deposits are in the coal basin between the Waterpocket Fold on the west and the mountains on the east. (Map from U.S. Geological Survey.)

that is in the Cretaceous rocks of the basin west of the mountains. Gilbert (1877) and Hunt (1953) studied the geology of the area and published comprehensive reports. Hunt's report included measurement of many exposures of the coal, and a later report by Doelling and Graham (1972) added to the available information on the coal deposits. Some springs in the area are shown on Hunt's map (1953, pl. 1), others are shown on the topographic quadrangles, and nearly all springs are shown on a map of the Henry Mountains Resource Area prepared by the U.S. Bureau of Land Management (1972). Open-file information on water wells and on streamflow have been available from the Water Resources Division, U.S. Geological Survey, and from the Utah Division of Water Rights. Open-file information about oil wells has been available from the Utah Oil and Gas Conservation Division. Also used in this report is certain information from test holes drilled by the Conservation Division, U.S. Geological Survey and by AMAX Coal Company.

The purpose of this report is to summarize the work done from June 1975 through July 1977, to present information on water supplies, and to make recommendations about where to obtain water supplies needed for different kinds of coal development.

Work done June 1975 - July 1977

Between June 25, 1975, and September 12, 1975, five trips, covering a total of 42 days, were made to the Henry Mountains area. During this period, about 105 springs or seeps were visited, and temperature and conductance measurements were made where flow was sufficient to insure reasonable reliability. The flow of these springs and the flow of many creeks were measured or estimated, and 47 water samples were collected and later analyzed chemically.

After the first field season, the work was concentrated on determining the structure of the sedimentary rocks, principally the Navajo Sandstone which is likely to be the best source of underground water, between the Waterpocket Fold on the west and the Dirty Devil and Colorado Rivers (Lake Powell) on the east.

Chemical analyses of water samples collected from springs, geology,

and assessments of sources for water supplies were presented in a Progress Report dated June 1976.

Between July 6, 1976 and September 2, 1976, three more trips covering 35 days, were made to the Henry Mountains area. Some springs visited in 1975 were revisited, and about 70 springs not visited in 1975 were visited. Flow measurements were repeated on many creeks, and 16 samples of spring, stream, and well waters were collected for chemical analysis. Eleven sandstone surface samples were collected and later analyzed for grain-size distribution and porosity. During the field work 16 sites on stream channels that drain the potential coal area were surveyed with tapes and brunton, and cross-channel profiles were drawn. These profiles are presented in the appendix. Grab samples of the channel sediments were turned over to the U.S. Geological Survey for further study. The profiles and sediment samples should be useful for "before-and-after" studies at these sites if coal is developed in the area.

In July 1977, six days were spent in the field revisiting about 25 springs and 15 stream sites, to determine the effect of the drought during the 1977 water year.

Methods of Work

Discharges of streams and springs were measured by capturing the flow with a tarp and measuring it with bucket and stopwatch. Extensive experimentation with the method suggests that measurements of flow of 0 to 300 gpm are accurate to ±3 to 5 percent and measurements of flows 300 to 750 gpm are accurate to ±5 to 10 percent.

The method involves selecting a channel site where a waterfall can be constructed. The stream must be flowing down a gradient steep enough to permit the water to be raised above the channel with the tarp and directed into a bucket as a waterfall. The typical site requires 10 to 30 minutes of preparation of the channel. This involves making a flume of rocks on which the tarp is placed. The upstream end of the tarp is buried in the stream channel and sealed with dirt or clay to prevent underflow. At the downstream end of the tarp a waterfall is formed, high

enough to direct the flow into an upright bucket of known volume. The flow into the bucket is then timed with a stop watch. At least three measurements are taken to insure reasonable accuracy.

The tarps we used were reinforced polyethylene of 6 x 8 ft and 6 x 12 ft. Buckets used were 2 gallons, 5 gallons, and 15 gallons.

Some measurements were made by splitting the flow into two channels and measuring each channel separately. This method is useful where flows are higher than can conveniently be measured with the available bucket. For example a 2-gallon bucket can measure 50 to 75 gallons per minute of single flow; if the flow is split, 100 to 125 gpm can be measured with the same bucket.

At nearly all sites, temperature was measured with a thermometer, and conductance with a conductance meter - in 1976 and 1977 conductance was measured with two meters.

GEOLOGY

Rock Units and Their Water-bearing Properties

Rocks exposed within the Henry Mountains area include a reasonably continuous sedimentary section from the Cutler Formation of Permian age to the Mesaverde Formation of Late Cretaceous age. After the Mesaverde was deposited, the sedimentary rocks were downwarped into a structural basin. Later, in Tertiary time, the mountain area was raised up when stocks and laccoliths, principally of diorite porphyry, intruded the sedimentary sequence. Since that time the intrusions and the uplifted sedimentary rocks have been extensively dissected by erosion, and many areas are covered by pediment gravels, probably principally of Pleistocene age. Continued erosion and deposition by streams have resulted in valley broadening and deposition of flood plains in the lower areas.

The descriptions of the exposed rocks are summarized in the attached table (table 1). The geologic map (fig. 2) is a copy of a portion of the Geologic Map of Southeastern Utah, compiled by L. H. Hintze and W. L. Stokes (1964).

TABLE 1. -THICKNESS, DESCRIPTION, TOPOGRAPHIC EXPRESSION, AND WATER-BEARING PROPERTIES OF ROCKS EXPOSED IN HENRY MOUNTAINS AREA, WAYNE AND GARFIELD COUNTIES, UTAH.

Source: Thickness and descriptive information chiefly from Hunt 1953.
Symbols in Formation column are those used on Geologic Map of figure 2

	GEOLOGIC SYSTEM	SERIES	FORMATION	THICKNESS	DESCRIPTION	TOPOGRAPHIC EXPRESSION	WATER-BEARING PROPERTIES
CENOZOIC	QUATERNARY	Holocene	Alluvium & colluvium Qay, Qos Qds	Variable	Unconsolidated deposits from streams, on slopes, and by wind	Partially fill most valleys and stream channels; talus and slopewash on slopes; eolian sand deposits cover large areas underlain by Entrada Sandstone.	Unconsolidated flood-plain deposits of Fremont River and major tributaries such as Sandy Creek and Sweetwater Creek probably would yield water to shallow wells. Quality probably would be comparable to quality of stream water.
		Pleistocene	Pediment gravel Qgs		Rounded cobbles and boulders generally in a sandy matrix	Caps some mesas where it forms slopes that grade away from mountains.	Supplies water to small springs and seeps where pediment surfaces are truncated.
	TERTIARY	Oligocene	Igneous stocks and laccoliths Tip		Mostly diorite porphyry	Forms domal intrusions at cores of the mountains, and forms horizontal, tongue-like, laccolithic intrusions around mountain cores.	The igneous rocks tend to hold water in overlying sediments or to direct its movement. Fracture zones around the stocks (cores) may act as conduits or reservoirs for water.
MESOZOIC	CRETACEOUS	Upper Cretaceous	Mesaverde Formation Kmv	400 feet	Thick-bedded sandstone separated by thin partings of shaly sandstone	Occurs only as the cap of Tarantula Mesa where it forms steep cliffs at the mesa edges.	Rainfall on Tarantula supplies only recharge for Mesaverde. Seeps occur at base; might supply wells with limited quantities of water from storage.
			MANCOS SHALE: Masuk Member Kmm	600-800	Lenticular beds at sandy gray shale, carbonaceous shale, and cross-bedded sandstone	Forms steep slopes with sandstone ledges.	Likely forms a confining unit; base may be water bearing.
			MANCOS SHALE: Emery Sandstone Ke	200-300	Lenticular sandstone, shale, and coal - upper 75 feet; Massive sandstone - lower 150 feet.	Caps many prominent mesas: Caineville, Factory Butte, Thompson, and Stevens. Forms cliffs around mesas.	Minor seeps and springs of poor quality water rise from the Emery. It may contain water in storage in the coal basin.
			MANCOS SHALE: Blue Gate Shale Kmbg	1500	Blue-gray marine shale	Forms badlands and long slopes below cliffs of Emery. Occurs in coal basin and mountain slopes.	Likely forms a confining unit.
			MANCOS SHALE: Ferron Sandstone Kfe	300 - 150 west east	Consists of three units of nearly equal thickness: Top-lenticular coal-bearing shale and sandstone; middle-massive sandstone; base-interbedded sandstone and shale	Cliff former. Forms the escarpment between the Blue Gate and Tununk.	Fresh water reported in a well (0-31-9)22. Yields water to Bert Avery spring. Probably should be tested by any well that penetrates it, for there may be water in storage in the coal basin.
			MANCOS SHALE: Tununk Shale Kmt	525-650	Oark blue-gray fissile marine shale; thin beds of shaly sandstone and bentonite	Forms badlands, undulating hills and areas of deeply weathered loose detritus. Occurs in coal basin and in mountains.	Likely forms a confining unit.
		Upper and Lower(?) Cretaceous	Dakota Sandstone Kd	0-50	Sandstone with conglomerate and carbonaceous beds. Locally contains coal.	Caps low mesas in south, forms discontinuous low hogback on east flank of Waterpocket Fold.	Eggnog spring and Thompson seep rise from Dakota. Probably too thin to produce water in quantity.
			UNCONFORMITY				
	JURASSIC	Upper Jurassic	Morrison Formation Jmbb, Jmsw	500-600	Sandstone, conglomerate, mudstone, and claystone; variegated color. Gypsum, jasper, and limestone common.	Exposed around periphery of structural basin. Forms the Pinto Hills.	Yields water of poor quality to a few small springs. Is reported to be wet in underground workings of uranium mine in Shitamaring Canyon.
			UNCONFORMITY				
			GLEN CANYON GROUP: Summerville Formation Jsu	250 - north 40 - south	Evenly bedded fine-grained sandstone with minor beds of shale, gypsum, and limestone	Forms minor cliffs and steep slopes below escarpments of Morrison sandstone or conglomerate.	Sandstones in these units may be water bearing locally, but many beds are thin or discontinuous and poorly sorted; none is likely to yield water in quantity.
			GLEN CANYON GROUP: Curtis Formation Jcu	175 - 0 Pinches out eastward	Evenly bedded gray sandstone and shaly sandstone with pebbles to one inch at base. Sandstone commonly has greenish caste	Forms gray and greenish slopes below the Morrison-Summerville escarpment	
			UNCONFORMITY				
			RAFAEL: Entrada Sandstone Je	300-north 700-southeast	Two facies: Western facies is red earthy sandstone, evenly bedded with large proportion of clay; eastern facies is massive cross-bedded sandstone	Oune sands cover large exposures of the Entrada in eastern part. Forms hoodoos and other queer-shaped erosional remnants	Western earthy facies may be too tight to yield water to wells; eastern sandy facies supports wells that produce water of good quality in the Hanksville area. The Entrada, especially the sandy facies, may have more potential to yield water than is presently recognized.
			SAN: Carmel Formation Jca	600 - 100 west east	Two facies: Thick western facies is red sandstone, shaly sandstone, limestone, gypsum, and gypsiferous sandstone; eastern facies is red shaly sandstone interbedded with red or buff fine-grained sandstone	Where underlying Navajo is steeply tilted most of Carmel is eroded into valleys; where Navajo is flat lying in east and southeast it remains partly capped by Carmel	Western facies may be water bearing in places but likely contains water of poor quality, about 3000mg/l. Wells that penetrate the western facies should seal off the Carmel. Eastern facies is probably too thin to contain water in quantity but it may be of good quality.
			UNCONFORMITY				
	TRIASSIC	Jurassic Upper Triassic	GLEN CANYON GROUP: Navajo Sandstone Jna	800 - 600 west east	Massive cross-bedded, fine-grained, well-sorted, eolian sandstone	Forms steep hogbacks along Waterpocket Fold and steep to vertical cliffs where it is nearly horizontal along Dirty Devil River	Yields 3 to 7 cfs to wells in the structural basin north of the Fremont River. Probably is completely saturated in the coal basin where water may be under sufficient confining pressure to give heads of 2000 + feet.
			GLEN CANYON GROUP: Kayenta Formation JTrk	240 - 320	Flat bedded, lenticular, and cross-bedded sandstone and shaly sandstone	These units underlie the structural basin but crop out only along the eastern margin or where they are upturned by the intrusives of Mt. Hillers, Ellsworth, and Holmes.	Generally is a confining unit. In other areas where Navajo and Kayenta are flat lying, springs issue from base of Navajo at contact with the Kayenta.
			GLEN CANYON GROUP: Wingate Sandstone Trw	270 - 380	Massive, very fine grained cross bedded sandstone loosely cemented with calcium carbonate		Probably is water bearing but its grains are finer than those of the Navajo (0.003 vs 0.01 inches) and therefore the Wingate may not yield its water very readily.
			UNCONFORMITY				
		Upper Triassic	Chinle Formation				
			Shinarump Conglomerate				
		Lower Triassic	Moenkopi Formation				
PALEOZOIC	PERMIAN		Cutler Formation				

Figure 2.— Geologic Map of Henry Mountains area, Wayne and Garfield Counties, Utah. Explanation of symbols on table 1. (A portion of Geologic Map of Southeastern Utah by Hintze and Stokes, 1964, scale 1:250,000).

SCALE

0 5 Miles

Structural Geology

The Henry Mountains area of this report is part of a slightly larger area, the Henry Mountains region, whose structure was described by Hunt (1953, p. 88):

> The Henry Mountains structural basin is one of the major structural depressions of the Colorado Plateaus and is the counterpart of the upwarps of the Circle Cliffs and the San Rafael Swell which border it, being of the same size and form, only inverted. The basin is diamond-shaped and is a little more than 100 miles long and 50 miles wide. All but the southernmost tip of the closed part of it is included in the area shown on plate 5 (equivalent here is figure 3). The fold is sharply asymmetric for the trough is crowded against the steep west flank.
>
> Although the Henry Mountains are near the geographic center of the basin, they are on the gentle east flank about 12 miles east of the trough (pl. 5)...
>
> Each of the Henry Mountains is a huge structural dome. The southern four domes are each 6 to 8 miles in diameter, whereas the northern dome, Mount Ellen, is twice that width. Each has several thousand feet of structural relief that interrupts the otherwise gentle east flank of the structural basin. The gentle west dip of this flank of the basin persists around the mountains and when projected through them meets with the dip on the other side (pl. 5).
>
> By and large the domes have smooth flanks but all, except the Mount Ellsworth dome, have superposed upon the top a great many small anticlinal noses and domes produced by the individual laccoliths or other intrusions. The smaller folds are each a mile or two in diameter, have a structural relief of a few hundred to 1,500 ft, and are not circular but are tongue-shaped, like the laccoliths that produce them...
>
> The Henry Mountains structural basin was produced by orogenic movements, probably in late Cretaceous or early Tertiary time. The major domes of the five mountains and the smaller anticlines on their tops were produced by intrusions, probably subsequent to the orogenic folding, perhaps in early or middle Tertiary time.

To expand on Hunt's description of the structural basin: the basin, as defined by the Navajo Sandstone for example, might be likened to a broad coal scoop. The relatively flat east edge of the scoop tilts gently upward to the east and is exposed along the Dirty Devil River and Lake

R 7 E
R 8 E
111°00'
R 9 E
R 10 E
45'
R 11 E
R 12 E
30'
R 13 E
UPPER BLUE MILLS
NORTH PINTO HILLS
SOUTH PINTO HILLS
BLUE MESA
SOUTH CAINVILLE MESA
NORTH CAINVILLE MESA
RED DESERT
Hanksville
South Hanksville
Blue Valley
Dry Valley
Muddy Creek
Pallute Canyon
Robbers Roost Canyon
Notom
Ranch
Cabin
BURR DESERT
East Gate Reservoir
Burr Point
BLUE MOUNTAIN
Water
HENRY MOUNTAINS
MT. ELLEN 11615
BERT MESA
POINT 5875
TURKEY KNOB
CEDAR
CEDAR MESA
FACTORY BUTTE
THE HORN
MOUNT HILLERS
MOUNT PENNELL
TAYLOR RIDGES
BIG RIDGE
CASS ERICHSEN PEAK
MOUNT HILLERS
WILLIS CREEK PEAK
Moldenwolfe Sands
Three Forks
Dirty Devil
Dirty Devil Lake
Trachyte Ranch
Uranium
Coyote Benches
TWAP MESA
Pennell Creek Bench
INDIAN SPRING BENCHES
HITE
COAL BASIN
WATERPOCKET FOLD
COAL MESA
CLAY POINT
THOMSON MESA
Upper Coal Pit
Burr Canyon
Fourmile Bench
PURPLE HILLS
GRAND GULCH
DESERT
Water Tanks
Spring
CANE SPRINGS
TICKBOO MESA
GOOD HOPE MESA
Good Hope Bar
MANCOS MESA
Olympia Bar
Sweetheart Bar
Topsoil Wash
Cottonwood Canyon
SAN JUAN COUNTY
GARFIELD COUNTY
KANE COUNTY
Bullfrog
Smith Bar
Stanton Cabin
Moki Bar
Guitar Bar
Coral Spring Bar
Fort Bottom
Halls Crossing
BULLFROG
MOKI
SCORPION
FLAT
WAYNE COUNTY
GARFIELD COUNTY
Bloody Hand Cave
Blue Bench
Blue Flats
North Blue Flats
Wash
Canyon
Mesa
Knoll
Creek
Spring
Water
Tank
Ranch
Cabin
Point
Bench
Valley
Gulch

Powell. From this eastern exposure the Navajo dips down westward beneath the younger sediments until it comes to the surface again at the steep back end of the scoop along the Waterpocket Fold. From the exposures in the east, where the top of the Navajo is at about 5000 feet, the gentle westward dip brings the top of the formation to about 600 feet (5700 feet below the surface) a few miles east of the fold. At the Waterpocket Fold the Navajo rises sharply upward to above 6000 feet.

In the vicinity of the mountains the top of the Navajo has been domed up 2000 to 3000 feet above the plane of the regional scoop. Presumably much of this doming is the result of a deep-seated intrusion (which Hunt does not mention) from which the stocks and laccoliths derived their material. The stocks and laccoliths further deformed the sediments they intruded. The intrusive stock of Mt. Ellen (the inner core of the mountain) cut vertically through the older sedimentary rocks (including the Navajo), and the lateral injection of the intrusions that formed the mushroom-shaped domes of the laccoliths of Mt. Ellen was principally into the Morrison and overlying formations (Hunt, pl. 8). Around Mt. Pennell and Mt. Hillers and also around Ellsworth and Holmes, however, the Navajo and even older formations were upturned by the intruding stocks, and some of the lateral intrusions penetrated between beds of these older formations. Thus, the intrusion of the most northern stock, Mt. Ellen, may not have materially changed the local doming of the Navajo, whereas the Mt. Pennell intrusion probably upturned the Navajo (fig. 4), and the three smaller intrusions to the south undoubtedly curled up the Navajo and even older formations around the edges of the stocks. The curling is especially spectacular around the southwest flank of Mt. Hillers where the triangular hogbacks formed by the upturned Navajo look like giant shark's teeth.

The broad scoop shape of the structural basin resulted from Laramide folding; the doming around the mountains resulted from the intrusive activity in Oligocene time (Hintze, 1973, p. 81). Between the Waterpocket Fold and the dome of the mountains, then, is a deep subsidiary basin, herein called the coal basin (fig. 4).

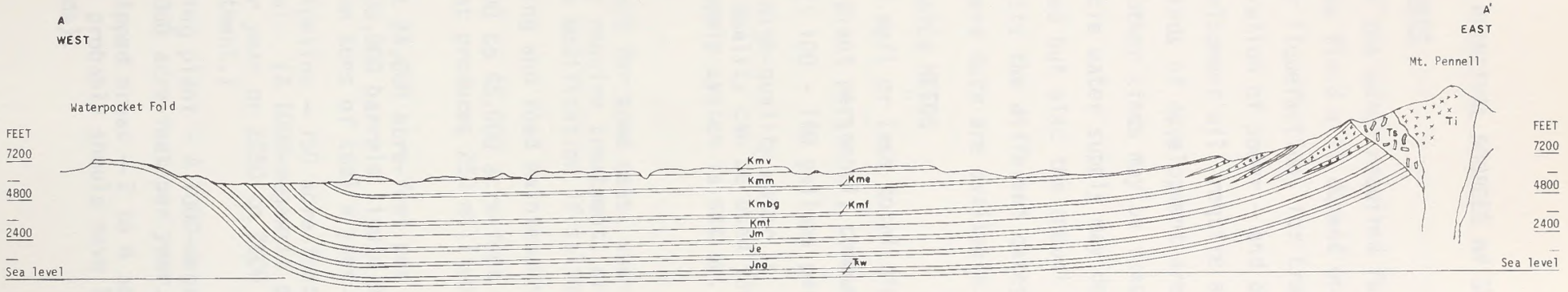

Figure 4. — West-to-east cross section through the coal basin from the Waterpocket Fold to the slopes of Mt. Pennell. This cross section shows the Tertiary turning up of the sedimentary rocks by the intrusions of Mt. Pennell as well as the older Laramide folding at the Waterpocket.

WATER DEMAND and PRINCIPAL SOURCES of SUPPLY

Water Demand for Coal Development

The amount and quality of the water required for development of the coal in the Henry Mountains field will depend on the kind of development — for gasification, for liquefaction, for transshipment elsewhere, or for mine-mouth generation of power — and on the rate of mining. Because any kind of development will require some quantity of water, it follows that some kinds of development are feasible only where water is abundant, but other kinds may be feasible with appreciably less water. The available water supply may determine not only the way the coal is to be developed but also the amount or rate of development. The following table lists the different categories of water needs and quantifies those needs where data are available:

WATER NEEDS

High-quality water — 500 mg/l or less total dissolved solids.

- Drinking — mine and plant personnel, community
- Domestic — community: 100 - 150 gallons per day per person
- Waste disposal — If high-quality water is in short supply, water of poorer quality can be used for waste disposal if a separate supply system is set up.
- Boiler water

Quality not critical — but for some uses, such as cooling, saline water may require treatment, or cooling equipment may require modification if saline water is used.

- Dust control in mining and road maintenance mining operations
- Gasification — 10,000 to 45,000 acre-feet per year for gasification plant that produces 250 million cubic feet of gas per day.
- Liquefaction — about 24,000 acre-feet per year for a plant that produces 100,000 barrels liquid per day and uses about 1.4 million tons of coal a year.
- Transportation by pipeline — 750 acre-feet per year per million tons of coal. (A 1000-megawatt plant requires 3 - 3½ million tons per year or 2250 to 2600 acre-feet per year for slurry treatment.)
- Cooling for generating plant — A 1000-megawatt generator consumes about 15,000 acre-feet per year.
- Revegetation of stripped areas — 2 to 4 acre-feet per acre per year (Water probably should have less than 1500 mg/l total solids).

Summary of Potential Sources of Supply

Water in the quantities required for gasification (10,000 to 45,000 acre-feet per year for a plant of 250 mcf gas per day), for liquefaction (24,000 acre-feet per year for a plant producing 100,000 bbls liquid per day), or for mine-mouth generation of power (15,000 acre-feet per year for a 1000-megawatt plant) may be available to the coal fields of the Henry Mts. basin only from deep ground-water supplies in the Navajo Sandstone, or less likely in the Entrada Sandstone. Even the amount required to ship 3 to 3 1/2 million tons of coal per year by pipeline (2250 to 2600 acre-feet) probably is not consistently available from nearby surface supplies, but it is likely that Oak Creek or Pleasant Creek, which get their water from Boulder Mountain west of the Waterpocket Fold, could supply such quantities if rights to the water can be purchased from present owners. But observation in 1977 showed that surface water supplies may be appreciably less in dry years. Water in limited quantities (say 200 to 400 acre-feet per year) for drinking and culinary purposes probably could be obtained during most years by pipeline from springs in the mountains east of the caol basin. Perhaps an equal amount could be obtained from Dugout and South Creeks by purchase of rights from the King Ranch.

The drought of 1976-77 showed that springs and the streams fed by them are not dependable sources during drought years, because most are fed by snowmelt and they thus dry up when there is little snow. Thus any use that depends on springs or surface water in this area should have available a back-up supply of ground water for use during drought years.

Sources of Water in the Henry Mountains area

The Henry Mountains area must be described as poor in readily available water supplies. Even so, it is possible to obtain water from three sources: 1) Water that falls on the area as rain or snow and feeds surface streams directly or later as spring water, 2) water in storage in shallow or deep water-bearing rocks, or 3) water that moves into or around the area by the Fremont River and its principal tributaries Oak Creek and Pleasant Creek.

The precipitation map (fig. 5) shows that only the top of Mt. Ellen receives more than 30 inches of precipitation a year and that much of the area receives less than eight inches. Satellite infrared photographs show that the vegetation is less dense on the Henry Mountains than it is on Boulder Mountain to the west or the Abajo Mountains to the east. Likely the Henry Mountains are in the rain shadow of Boulder Mountain and the Aquarius Plateau which together form a very massive area at high altitude west of the Waterpocket Fold. The smaller amounts of precipitation on the Henrys fall on steep slopes which generate runoff that is dissipated rapidly, both by the local vegetation and by penetrating into the ground where some of it may recharge one or more of the possible aquifers. Some of the water that penetrates the land surface emerges downslope as springs, whose waters generally are dissipated again rather rapidly. About the only watercourse that regularly brings water below 5500 feet is Bull Creek which flows northeastward off Mt. Ellen, and is diverted to supply irrigation water for Fairview Ranch.

But Bull Creek, like other watercourses in the Henry Mountains, depends on snowmelt and hence its flow to Fairview of about 65 gpm on July 2, 1977 was only a small fraction of the more than 600 gpm measured on August 3, 1976.

The amount of precipitation that falls on the flat mesas is related to their altitude: Tarantula Mesa, whose top ranges from 6300 to 7100 feet, supports appreciably more vegetation than do Wildcat and Swap Mesas which are about 1000 feet lower.

All-in-all the direct precipitation supports local vegetation but provides little or no runoff except as flash floods. Therefore any attempt to use the direct precipitation must be based on capturing spring water essentially at its source. Information about the small quantities of good quality water that might be captured from springs is given in the section on culinary water below.

Water in Deep and Shallow Aquifers

The water-bearing properties of all exposed rock units are shown in Table 1 in the section on Geology. Here it will be sufficient to

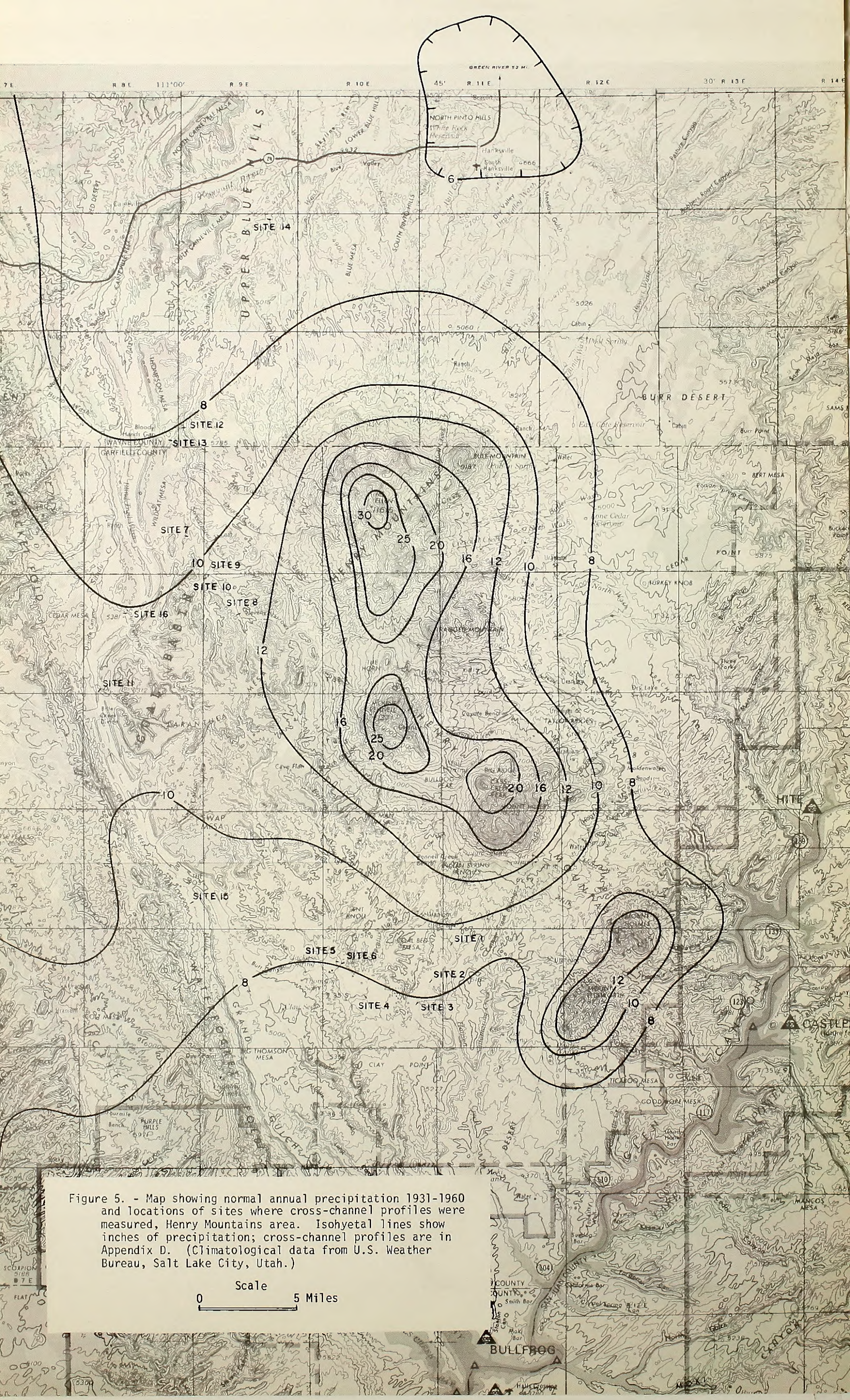

Figure 5. - Map showing normal annual precipitation 1931-1960 and locations of sites where cross-channel profiles were measured, Henry Mountains area. Isohyetal lines show inches of precipitation; cross-channel profiles are in Appendix D. (Climatological data from U.S. Weather Bureau, Salt Lake City, Utah.)

Scale
0 5 Miles

name the sandstones that possibly are water-bearing - from oldest to youngest, the Wingate, Navajo, Entrada, Morrison, Dakota, Ferron, Emery, and Mesaverde - and then to qualitatively evaluate the potential of each. The Navajo Sandstone is undoubtedly the unit with the greatest potential and therefore it will be treated separately in the next section.

Of the other units, the two deepest aquifers will be considered first and then the five younger sandstones.

The Wingate Sandstone probably contains water but it is finer grained, 0.003 inches vs 0.01 inches (Hunt, 1953), than the Navajo and therefore probably is appreciably less permeable than the Navajo. It is not likely to be a target where the overlying Navajo contains water.

The Entrada Sandstone crops out over large areas both east and west of the mountains and consequently has large potential recharge. Furthermore it yields water of good quality to wells in the vicinity of Hanksville. Therefore, because it forms part of the favorable synclinal structure and because it is probably 500 to 750 feet thick, it should be a good target for exploration. Yet a well (D-38-8)29dcb (N-2 on fig. 6) in 1973-1974 penetrated the Entrada and got its water from the Navajo; and the IPP well, (D-28-8)33bbb (N-3 on fig. 6), drilled in 1975, penetrated the Entrada but drew its water from the deeper Navajo. Evidently the Entrada is too "tight" in most areas to yield more than small quantities. The "tightness" of the Entrada is confirmed by they grain-size analyses reported in appendix E. They show that the two samples of Entrada are finer grained and contain a larger silt and clay fraction than any of the other eight samples examined. Thus the Entrada may be worth testing if found to yield water, but bypassed if the yields are low.

The five younger sandstones, the Morrison, Dakota, Ferron, Emery, and Mesaverde, are all folded into the coal basin (fig. 4) and they therefore should be tested by any wells that penetrate. None is likely to produce enough water to supply a coal-development project, but one or more of them might produce some water whose usefulness would depend on quality. The Morrison is reported by uranium miners to contain

water in the mines northward from Shitamaring (Shootaring) Canyon (Jerry Ekker, personal communication), and drillers of test holes north of the mines also report water in 1977 in the Morrison. The Dakota is probably too thin to supply significant quantities of water, and the Mesaverde at the top of Tarantula Mesa is probably too well drained to retain much water in storage, but the Ferron and Emery may contain significant amounts of water in storage. Both the Ferron and Emery are exposed over large areas of potential recharge, and although dissection has probably resulted in the draining of most water from the outcrop areas, the synclinal structure would favor movement of some water into the coal basin. Both units, therefore, are worth testing, for the porosities of surface samples of Ferron at 20-25 percent and of Emery at 26 and 27 percent are even higher than the porosities of samples of Entrada and Navajo, both at 18 percent (Appendix E).

Water in the Navajo Sandstone

Wells drilled to test the Navajo in the basin north of the Fremont River have reported yields of as much as 2800 and 3100 gpm (N2 and N3, table 3). These wells produced water of rather poor quality (table 4), but it is possible that dissolved minerals were coming from the overlying Carmel. Other wells of lower yield (N5,6,7,8, and 9, table 3) have been drilled in various localities around the mountains and they produce water of good quality (table 4). In addition, logs of three oil-test wells report fresh water in the Navajo south of the coal basin:

Operator	Location	Depth to Navajo	Altitude of Navajo
Skyline Oil	T.35S., R.9E., sec. 36	1573	3531
Cleary Funds, Inc.	T.36S., R.10E., sec. 20	1340	3620 ±
Skyline Oil	T.36S., R.11E., sec. 19	574	3500 ±

In contrast at least four oil-test wells drilled northeast of the mountains report no water in the Navajo:

Operator	Location	Depth to Navajo	Altitude of Navajo
Amerada Petroleum	T.29S., R.11E., Sec. 2	643	3859
Kimbark Co.	T.29S., R.12E., Sec. 30	—	—
Phillips Petroleum	T.29S., R.13E., Sec. 1*	30	5225
Phillips Petroleum	T.29S., R.13E., Sec. 1*	25	5230

*These wells are east of the Dirty Devil River. Both wells were reported to have water in the Wingate below about 900 feet.

The available information suggests that water in large quantities but perhaps of uncertain quality should be obtainable from the Navajo in the vicinity of the coal basin. Beneath Tarantula Mesa, the top of the 800-foot-thick Navajo should be about 5700 feet below the mesa top (fig. 4). The mesa top dips gently westward, as does the Navajo in the subsurface. The Navajo should be saturated, and artesian pressure should make the water rise 2000 feet or more above the top of the formation. If this interpretation is correct, it should be possible to pump 500 to 2000 gallons per minute (800 to 3200 acre-feet per year) from each well. Water so pumped would be removed from storage and likely would be replaced by natural recharge only at a rate much slower than the pumping rate (the problem of recharge vs discharge is discussed in more detail below). However, if the porosity of the Navajo is 10 percent (a low estimate, for a porosity determination made on this project gave 18 percent — see Appendix E), there is minimum of 50,000 acre-feet of water in storage in the Navajo for each square mile of surface. Careful spacing of the producing wells could permit them to supply 20,000 to 30,000 acre-feet a year during the productive life of the coal field.

Any plan to develop water in the Navajo will likely raise several questions:

a) is water in the Navajo stagnant or is it moving from recharge areas to discharge areas? how fresh is the water in the Navajo?
b) will quantities pumped be matched by recharge?
c) what effect will pumping have on recharge or discharge area?

Obviously these questions and their answers are interrelated, and, although it may be difficult to give absolute answers to the questions, it may be possible to come up with probable answers by considering the local structure and great extent of the Navajo, its performance as an aquifer elsewhere, and by evaluating information from water wells north of the Fremont, as well as from wells in this area.

The structural basin formed by the Navajo in the Henry Mts. area (figs. 3 & 4) may be likened to a nearly flat scoop whose steep back end

is the Waterpocket fold on the west and whose eastern edge is exposed along the Dirty Devil and Colorado Rivers. This scoop has been penetrated and domed up locally by the five stocks that form the core of the mountains. The doming by the mountains has resulted in a subsidiary basin, here called the coal basin, between the mountains and the Waterpocket Fold.

Probably the principal recharge to the Navajo in the coal basin comes from the streams that cross outcrops of the Navajo along the Waterpocket Fold. The principal water carriers are the Fremont River, Pleasant Creek, and Oak Creek, but there are many minor ephemeral channels that could provide slight recharge. Recharge from streams that cross the fold occurs at elevations from about 5200 feet on the Fremont to about 6000 feet on Oak Creek. Slight recharge may also occur where the Navajo is upturned and exposed along the south and southwest flanks of Mt. Hillers and along the northwest flanks of Mt. Holmes and Mt. Ellsworth. The low rainfall in these areas makes appreciable recharge highly unlikely but the well that penetrates the Navajo in Shitamaring Canyon, (D 35-11)16dcd, bottom at about 4000 feet, may owe the freshness of its water to recharge from Mt. Ellsworth. Another possible, but completely unevaluated, source of recharge is the shatter zones around the stocks. These zones are in areas of relatively high precipitation and they may feed water into beds of Navajo that they contact (see figure 4).

In the deep part of the coal basin the base of the Navajo is about at sea level and the top is 800 feet higher. The Navajo rises southward and is exposed at the surface at Lake Powell. The lowest areas of outcrop of the Navajo are now covered by 300 feet of water by Lake Powell to about 3700 feet. Before Lake Powell began to fill, the Navajo possibly discharged water to the Colorado River (there are no known records to support this idea at Bullfrog Basin, but at Wahweap records of wells drilled to supply water for the building of Glen Canyon dam show pre-Lake Powell water levels that slope downward toward the river (Goode, 1964, p. 61). Today it is likely that the rise of Lake Powell has in part reversed that slope and that water is moving northward from Lake

Powell into the Navajo. This water ultimately will provide additional recharge to the coal basin, but likely will require many years to raise artesian pressures 30 or more miles from this new source of recharge.

If the Colorado River in the vicinity of the present Bullfrog Basin once was the principal discharge area for water in the Navajo, were (are) there any others? Some discharge has been reported where the Dirty Devil River cuts into the Navajo 15 to 20 miles northeast of Mt. Ellen, but I found only one spot of leakage, no flow just moisture for vegetation, from the Navajo during a boat traverse I made in September 1975 between Bullfrog Basin and Ticaboo Canyon.

The only other likely natural discharge is by upward movement through the overlying sediments. There is no field evidence to support this premise, but upward movement through fractures is certainly possible through all the units between the top of the Navajo and the Dakota (Carmel, Entrada, Curtis, Summerville, Morrison). It is highly unlikely, however, that water would move upward through the Mancos Shale. More likely, water reaching the shale would seal fractures, and upward movement would stop.

Probably much of the water that may rise from the Navajo from the bottom of the coal basin would be diverted laterally by any permeable units, such as the Entrada, Summerville, and Morrison. These units could discharge appreciable quantities through seepage that would simply support surface vegetation.

At present this premise is strictly speculative, but, if upward and lateral movement of water is occurring, sandstone units between the Mancos and the Navajo may contain exploitable water, and water in the Navajo may be fresher because of the movement.

The above discussion of recharge to and possible discharge from the Navajo has not been quantitative because no quantitative information is available. Yet it is possible to add to the picture. The Navajo is an efficient aquifer in many places - Black Mesa, Arizona, near St. George, Utah, and at Glen Canyon Dam - and scattered wells in this area and new wells near Caineville attest that it must contain water here. Water in

the Navajo beneath the coal basin must be in equilibrium with the present environment: natural discharge, by whatever means, must be matched by recharge. But water moves slowly through the Navajo and therefore both discharge and recharge are small. Nevertheless it is safe to assume that the Navajo is full of water right up to the sources of recharge. In other words water does not "pour" into the Navajo from the Fremont or from Pleasant or Oak Creeks, but rather it moves slowly in response to the distant discharge. The Navajo, then, represents a vast "plumbing" system that has been filling with water for millions of years until it is now as full as it can be. (Obviously if the rise of water in Lake Powell has had the effect of damming discharge points by temporarily reversing the flow in the Navajo, in that area the Navajo will continue to gain water).

The Navajo underlies about 700 square miles in the area bounded by the Waterpocket Fold, the Fremont River, the Henry Mts., and Bullfrog Basin. In much of this area it is probably saturated through most of its 800-foot thickness. If its porosity is a conservative 10 percent - Cordova and others estimated as much as 30 percent specific yield (essentially same as porosity) in the St. George area (1972, p. 28) - each square mile contains about 50,000 acre-feet of water (10% x 800 x 640), which, in most of the area of possible coal development, is under artesian pressure of several thousand feet. Partly because water that is under high pressure expands as pressure is released, it is likely that widely spaced wells - in Black Mesa, Arizona, deep artesian wells are spaced 2 miles apart (Peabody Coal Co., 1970, p. 10) - could withdraw 500 gpm simply by pumping to reduce the pressure in the aquifer. Ultimately, the water withdrawn would be replaced at least in part by natural recharge, but likely it would require a long time, years or perhaps decades, before the reduction in pressure in the aquifer would result in increased recharge by the principal stream sources.

Thus to briefly answer the questions posed above:

a) Water in the Navajo probably is not stagnant but it may be moving exceedingly slowly in most places. Its freshness in the Shitamaring well (N-8 on fig. 6) suggest closeness to

recharge and perhaps relatively rapid movement; its poor quality in wells north of the Fremont (N-1,N-2,N-3,N-4) suggests distant recharge and slow movement (or perhaps contamination from the overlying Carmel).

b) Because wells pumped in the coal basin probably will be many miles from recharge, it is likely that water pumped for the first few years will come from storage and that recharge areas will not be affected for a long time.

c) The effect pumping may have on natural discharge areas is unknown because those areas themselves are unknown. The effect of the pumping on recharge areas is covered in b).

Water from Surface Sources

Sources of surface water that might supply some water for the coal basin include local streams, more distant sources such as Oak Creek and Pleasant Creek, both of which rise on Boulder Mountain to the west, and the Fremont River itself. All are subject to wide variations in discharge and much if not all the water has been appropriated or is subject to strong protest by holders of current rights.

Measurements and estimates of discharge (1975-1977) of many streams that drain the Henry Mountains are given in Appendix B and some are plotted on the map of figure 6. The discharges observed in 1977 are all much lower than discharges observed in 1975 or 1976, and they serve as a warning that surface waters cannot be considered to be dependable sources of supply.

Like all creeks in the Henry Mountains area, the creeks that drain the coal basin, principally Sweetwater Creek and its tributaries to the north and Bullfrog and Hansen Creeks and their tributaries to the south, are fed by snowmelt and springs in their headwaters, but are generally intermittent below about 5000 feet. In their lower reaches these streams are generally "dry except for short periods of flood immediately after local storms" (Hunt, 1953, p. 212). Thus the streams near the coal deposits are not likely to provide dependable supplies, although some of the springs that provide headwaters flow might be tapped as described below under culinary water.

At the present time water from South and Dugout Creeks, tributaries to Sweetwater, is diverted for irrigation on the King Ranch. The amount diverted is not known, but estimates of the flows of these two creeks indicate that during spring and summer in years of normal precipitation they might yield about 2 cfs of water of good quality. The right to use this water for coal development might be purchased from the present owner.

Oak Creek and Pleasant Creek rise on Boulder Mountain west of the Waterpocket Fold and then flow eastward and northward to join the Fremont River. Water rights recorded by the State Engineer (Proposed Determination

of Water Rights in Colorado River Drainage Area, Dirty Devil River Division, Pleasant Creek and Sandy Creek Subdivisions, no date) suggest that each of these creeks yields 7,000 to 10,000 acre-feet. But this water is diverted by holders of the rights, so that little water, except possibly from flash floods, flows from these creeks to the Fremont. We have a measurement of one diversion of 5 cfs from Oak Creek at the mouth of Oak Creek Canyon and spot estimates on Oak and Pleasant Creeks (Appendix B). In addition, the U.S. Geological Survey measured Pleasant Creek 0.2 mile above its confluence with the Fremont from March 1969 through September 1972 and recorded discharges of 3020 acre-feet in water year 1970, 2340 in 1971, and 1510 in 1972 (U.S. Geological Survey 1970, 1971, 1972). If water from either or both of these streams could be diverted where they cross the Navajo Sandstone it is likely that the water would be of good quality, less than 500 mg/l total solids. But the acquiring of rights to as much as 5000 acre-feet a year would be a costly and time consuming project.

The Fremont River discharged at Caineville an average of 67.1 cubic feet per second (cfs) for a total of 51,150 acre-feet per year from March 1967 through September 1974. Maximum discharge was 2310 cfs on August 27, 1971, and the minimum discharge was 11 cfs on August 13-15, 1972 (U.S. Geological Survey, 1975). The range in quality of water in the Fremont River was equally great, as these figures, which were abstracted from the computer records of the U.S. Geological Survey, show:

Date	Discharge cfs	Dissolved Solids mg/l	Specific Conductance mmho
3/14/67	82	444	620
9/12/67	47	737	952
6/17/69	250	3010	3060
8/15/69	64	2030	2110
1/15/70	164	412	588
5/14/70	112	392	543
9/8/70	104	536	730
3/16/71	92	379	606
9/14/71	45	--	825
3/24/72	53	--	740
8/9/72	28	--	700
5/1/73	601	--	320
6/7/74	28	--	490
4/16/75	76	--	660
8/28/75	35	519	790
5/25/76	31	637	870

In addition to dissolved minerals, the Fremont River commonly carries a heavy load of sediment as U.S. Geological Survey records near Caineville between March 1967 and May 1972 show:

Water year	Discharge acre-feet	Suspended load Tons
1968	49,200	101,105
1969	46,750	414,519
1970	48,200	60,461
1971	54,400	171,441
Oct. 1, 1971 to May 31, 1972	36,750	24,661

In one day, on July 20, 1969, with a total discharge of about 196 acre-feet, the Fremont River carried a load of 48,100 tons (U.S. Geological Survey, 1969, p. 72), nearly 80 percent of the total load carried by the River in 1970.

Any plan to use water for coal development from the Fremont would have to consider the wide ranges both in chemical quality and amount of suspended sediment.

Culinary Water from Springs

Springs that rise on the west slopes of Mt. Ellen and Mt. Pennell might supply culinary water via pipeline to the coal fields. The table below gives locations and yields of such springs and indicates areas that might be supplied by them.

Spring name and location	Yield[2]	Total Dissolved Solids	Area to to be supplied	Approximate pipeline distance miles
Oak Springs (Sw-49,50)[1] Wayne-Garfield County line Sec. 33, T.30S., R10E.	300 - 400 gpm	190-350	Stevens Mesa	6
Elk Head Spring (Bf-9) Sec. 33, T.32S., R.10E.	80	244	Tarantula	6-7
Pine Spring (Bf-11) Sec. 4, T.33S., R.10E.	60 1.8 (77)	215	School sections 36 in T.32S., R.9E. 2 in T.33S., R.9E.	2-3
Cass Res. Spr. (Bf-21) Sec. 32, T.33S., R.11E.	65 20 (77)	210	Tarantula Cave Flat	11 9

1/ Numbers in parentheses identify these springs in Appendix A and on figure 6.

2/ The two measurements identified by (77) show decrease in yields in 1977 as a result of drought.

With adequate storage facilities, any one of these springs could supply the domestic needs of several hundred people, during years of normal precipitation. But they cannot be relied on after winters of low snowfall on the mountains.

Chemical Quality of Water — from springs, wells, streams

Springs.

Table 2 lists 61 analyses of water samples collected from 52 springs; of the 61 samples, 48 were collected as part of this project, and the other 13 were collected by others.

The analyses show a wide range in chemical quality: Benson Spring (TC-15) and Black Canyon Spring (TC-6) are low in dissolved solids with 119 and 118 mg/l respectively, whereas Swap Canyon Spring (H1-7) has more then 8800 mg/l.

Thirty-three springs have less than 500 mg/l dissolved solids, 18 springs have between 675 and 8800 mg/l, and one spring, McMillan (Sw-11), has 493 or 506 mg/l as determined for two samples collected 8 days apart.

Except for the five springs that yield poor water from the Emery and the two springs that yield poor water from the Dakota, there is little correlation between the chemical quality of water and the geologic unit identified at the orifice of a spring. Springs that rise from the Mancos and Morrison yield waters that contain both more and less than 500 mg/l dissolved solids. Most springs that rise from colluvium or alluvium yield water of less than 500 mg/l, but Mill Race (HC-15) with 3380 mg/l is certainly an exception.

One generalization can be made from the chemical analyses: all sampled springs that yield 50 gpm (.11 cfs) or more supply water that contains less than 500 mg/l dissolved solids. Most of these springs rise above 7000 feet and thus are close to the snowmelt that supplies them. The only "spring" in this category below 7000 feet is Cow Wash Spring (DV-1) which is supplied by return flow from irrigation on Fairview Ranch.

Similarly, all ten springs that supply water containing more than 1000 mg/l yield 5 gpm (.01 cfs) or less, generally much less. However, low yield is not always an indicator of poor quality, for Dell Seeps (PB-5) yields excellent water, 160 mg/l, from the Entrada; Ticaboo

TABLE 2.-CHEMICAL ANALYSES OF WATER FROM SELECTED SPRINGS, HENRY MOUNTAINS AREA, WAYNE AND GARFIELD COUNTIES, UTAH

(LOCATIONS OF SPRINGS ARE SHOWN ON FIGURE 6.)

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY

PROCESS DATE 06/20/77

MULTIPLE STATION LISTING

Map Number	Name	LOCAL IDENTIFIER	STATION NUMBER	DATE OF SAMPLE	GEOLOGIC UNIT 1)	INSTANTANEOUS DISCHARGE (CFS) (00061)	TEMPERATURE (DEG C) (00010)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	PH (UNITS) (00400)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DISSOLVED BORON (B) (UG/L) (01020)	DISSOLVED ARSENIC (AS) (UG/L) (01000)	DISSOLVED LEAD (PB) (UG/L) (01049)	DISSOLVED LITHIUM (LI) (UG/L) (01130)	DISSOLVED ZINC (ZN) (UG/L) (01090)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	HARDNESS (CA+MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	SODIUM ADSORPTION RATIO (00931)
SC-1	Divide Canyon	(D-33- 8) 2CCO-S1	375739111000 3	75-08-13	211MVRO	< .01	14.5	7.8	200	80	28	4.3	256	--	620	15	.05	.9	.01	.03	120	0	1	130	10	1080	1120	1500	830	620	0.4
SC-2	Spring Canyon	(D-32- 8)21BOA-S1	380041111015600	76-09-01	211EMRY	< .01	20	13	220	150	270	8.5	479	7.1	1400	22	.02	.4	.01	.03	270	2	0	130	10	2320	2460	2975	1200	770	3.4
SC-7	Blind Trail	(D-31- 8)27DAB-S1	380450111003101	75-07-22	211EMRY	< .01	--	9.8	200	140	230	7.1	368	--	1200	20	.05	.3	.01	.03	200	--	--	--	--	1990	--	2580	1100	770	3.1
-7				75-08-22	211EMRY	--	19.0	10	160	160	240	6.6	383	--	1200	19	.02	.2	.00	.00	210	0	2	80	350	1990	2220	2500	1100	740	3.2
SW-1	Igneous	(D-32-10) 8DDC-S1	380219110500501	75-08-14	111CLVM	.01	23.0	20	60	14	11	.2	222	--	39	4.8	.01	.3	.02	.06	210	2	2	0	0	259	265	440	210	25	.3
SW-2	Six Gallon	(D-32-10) 8CBD-S1	380203110500800	75-08-14	111CLVM	.01	13.0	21	180	58	37	.3	270	--	500	14	.01	.4	.01	.03	560	0	1	30	0	944	997	1250	690	470	.6
SW-4	O&O-A	(D-32-10)18CBA-S1	380121110512000	75-08-14	200MNCS	< .01	15.5	8.1	430	460	1000	26	423	--	4600	40	.06	.3	.01	.03	410	0	2	1300	20	6780	7660	6500	3000	2600	8.0
SW-9	Willow East	(D-31-10)32BCB-S1	380410110502200	75-07-30	200MNCS	.01	7.0	14	120	58	31	2.5	309	--	290	12	.19	.1	.01	.03	70	0	6	0	0	681	723	1050	540	290	.6
SW-10	Willow Wildlife	(D-31-10)31ADA-S1	380431110502600	75-07-22	200MNCS	--	--	15	110	27	14	1.4	239	--	200	3.1	.52	.3	.01	.03	60	--	--	--	--	491	--	730	390	190	.3
-10				75-07-30	200MNCS	.25	8.0	15	100	28	14	.8	233	--	190	2.7	.53	.3	.01	.03	20	0	11	20	0	468	499	740	370	170	.3
SW-11	McMillan	(D-31-10)31ABB-S1	380422110505401	75-07-22	111CLVM	--	--	16	110	30	17	1.1	267	--	180	6.0	.21	.3	.01	.03	80	--	--	--	--	493	--	781	400	180	.4
-11				75-07-30	111CLVM	--	9.0	15	110	32	16	1.2	275	--	190	4.9	.25	.3	.00	.00	50	1	13	0	10	506	542	750	410	180	.3
SW-17	Dripping Rock	(D-31- 8)24CAA-S1	380543110584101	75-08-22	211EMRY	.01	15.0	8.9	140	120	74	4.3	364	--	630	11	.02	.2	.00	.00	110	0	1	50	10	1170	1240	1500	840	550	1.1
SW-23	Corral Point	(D-31-10)29BDB-S1	380505110500701	76-07-29	111CLVM	.07	7.5	11	57	7.4	7.3	.5	149	--	64	2.7	.15	.2	.00	.00	30	0	3	10	10	224	220	350	170	51	.2
SW-25	Beaver Dam	(D-31-10)30ADA-S1	380503110502501	76-07-29	111CLVM	.11	8.0	9.5	72	16	8.2	.8	205	--	80	2.8	.09	.2	.00	.00	30	0	4	10	10	291	245	460	250	78	.2
SW-26	Aspen Hole	(D-31-10)30AAA-S1	380513110502601	76-07-29	111CLVM	.11	8.0	11	56	6.9	7.6	.5	147	--	64	3.0	.29	.2	.00	.00	30	0	0	10	0	223	216	340	170	48	.3
SW-29	North Fork South	(D-31-10)20BBD-S1	380559110501600	75-07-30	111CLVM	.15	5.5	13	49	5.0	6.7	.3	150	--	35	2.5	.01	.2	.01	.03	30	4	4	0	10	186	189	340	140	20	.2
SW-31	Dead Cows	(D-31- 9)17CBA-S1	380636110565200	75-07-31	200MNCS	.02	25	19	150	67	62	.8	248	--	520	29	.01	.5	.01	.03	110	0	3	30	0	971	1050	1350	650	450	1.1
SW-49	Oak South	(D-30-10)33CDB-S1	380917110501900	75-07-26	200MNCS	.35	8.0	13	52	5.0	6.0	.5	155	--	34	2.8	.02	.2	.00	.00	30	0	2	0	0	190	204	320	150	23	.2
TW-4	Jet Basin	(D-30-10)23CBB-S1	381113110481900	76-08-28	200MNCS	.03	13.5	15	82	18	40	1.5	257	8.2	130	6.6	.17	.3	.01	.03	80	0	0	30	0	421	387	680	280	68	1.0
Bu-2	Lonesome Beaver	(D-31-10)14BDC-S1	380643110462901	75-07-22	200MNCS	--	5.0	12	64	10	6.9	.5	174	--	61	3.1	.11	.2	.01	.03	50	--	--	--	--	244	--	314	200	58	.2
-2				75-07-29	200MNCS	--	9.0	11	67	11	6.7	.5	178	--	66	2.0	.06	.2	.00	.00	30	0	9	0	20	252	267	410	210	67	.2
Bu-5	Birch	(D-30-10)25BCB-S1	381036110471701	76-08-27	110PTOD	.03	15.0	17	90	16	23	.5	223	8.2	130	11	.01	.4	.00	.00	170	0	4	10	10	398	354	620	290	110	.6
Bu-6	McClellan Wash	(D-30-10)25BBA-S1	381050110470401	76-08-27	110PTOD	.05	17.0	20	110	21	36	.6	244	8.2	160	14	.01	.5	.01	.03	210	0	3	10	0	483	471	770	360	160	.8
OV-1	Cow Wash	(D-30-11) 5DBC-S1	381332110441800	76-08-03	110PTOD	.22	23	21	89	18	39	1.1	210	--	180	6.1	.01	.9	.00	.00	100	1	0	20	0	459	472	680	300	120	1.0
BG-9	Angel Cove	(D-29-13) 7ABC-S1	381828110320901	76-09-21	220NVJO	.00	16.5	9.3	35	47	41	8.6	332	--	55	23	.09	.3	.00	.00	50	--	--	--	--	384	--	640	280	9	1.1
PB-1	Poison	(D-31-11) 1BDC-S1	380827110391001	75-08-01	221MRSN	< .01	24.5	12	170	37	21	2.9	194	--	420	10	.00	.3	.01	.03	70	7	3	20	10	769	814	1025	580	420	.4
PB-5	Dell Seeps	(D-30-13)30CAD-S1	381014110321700	75-07-28	221ENWO	.01	27.0	14	22	14	9.4	3.6	107	--	30	7.4	1.4	.3	.01	.03	30	15	4	0	100	160	161	255	110	25	.4
PB-6		(D-31-13) 9ACD-S1	380735110292301	57-06-20	231WNGT	--	17.5	9.1	25	28	46	8.5	275	7.4	44	12	--	.3	--	--	60	--	<1	--	--	312	305	528	176	0	1.5
-6				76-07-26	231WNGT	--	19.0	8.9	25	30	47	9.4	274	7.6	50	12	1.2	.5	.00	.00	90	--	--	--	--	323	--	550	190	0	1.5
NW-5	Cottonwood	(D-32-11)24AAA-S1	380051110382600	75-08-01	221MRSN	.02	15.5	11	62	36	24	3.2	293	--	88	10	.30	.3	.01	.03	60	0	3	30	10	380	383	610	300	63	.6
-	Cottonwood Pipe	(D-32-12)19BBC-S1	380048110381600	75-08-01	221MRSN	.01	30.0	9.8	35	50	41	5.1	253	--	150	13	.01	.3	.01	.03	90	0	8	0	10	429	439	830	290	86	1.0
NW-11	South Hog	(D-33-13) 5DAC-S1	375742110294601	75-05-13	231WNGT	--	--	10	44	42	40	9.9	315	--	94	10	.00	.4	.03	.09	90	--	--	--	--	406	--	689	280	24	1.0
NW-12	North Wash	(D-33-13)15BDC-S1	375612110281101	63-06-09	231WNGT	--	14.5	10	34	31	--	--	281	7.5	63	9.0	--	--	--	--	--	--	--	--	--	332	308	562	210	0	1.5
TC-5	Hancock	(D-32-10)34DBB-S1	375847110473300	75-07-08	111CLVM	.04	5.5	12	74	7.9	7.3	.5	192	--	67	2.2	.25	.3	.02	.06	20	1	4	0	0	267	247	350	220	60	.2
-5				75-08-14	111CLVM	.02	5.0	12	71	9.0	7.0	.4	200	--	57	2.8	.29	.3	.00	.00	30	1	3	0	0	259	258	420	210	50	.2
TC-6	Black Canyon	(D-32-10)35BCC-S1	375849110470401	75-08-16	111ALVM	.07	4.0	8.8	33	4.3	3.0	.5	92	--	21	2.3	.03	.1	.00	.00	20	2	1	0	0	119	113	170	100	25	.1
TC-9	Willow Spring	(D-32-10)35DCC-S1	375828110462600	75-07-09	111CLVM	.05	6.0	11	86	12	5.6	.6	220	--	87	2.7	.04	.2	.02	.06	30	0	5	0	0	314	303	350	260	84	.2
TC-14	Aspen	(D-33-11)21BCD-S1	375521110423200	75-08-01	200MNCS	.06	8.0	23	62	12	9.8	.3	158	--	55	22	.04	.3	.01	.03	30	0	6	0	0	263	275	420	200	75	.3
TC-15	Benson	(D-33-11)15CAD-S1	375604110411000	75-08-02	111CLVM	.35	9.0	15	28	3.0	6.0	.2	93	--	14	2.5	.62	.2	.03	.09	110	4	3	0	0	118	119	185	82	6	.3
TC-21	Starr	(D-34-11)14DBB-S1	375103110395301	75-05-13	111LOLO	--	--	15	46	6.2	7.3	.5	146	--	34	2.7	.00	.3	.03	.09	20	--	--	--	--	184	--	310	140	21	.3
-21				75-08-03	111LOLO	.2	22.0	16	50	6.3	8.1	.5	151	--	38	2.2	.01	.4	.01	.03	20	0	3	0	10	196	199	320	150	27	.3
LR-2	Ticaboo Shelf	T(D-35-12)27CCA-S1	374206110344800	75-08-18	221CRML	< .01	28.0	17	36	28	20	2.9	197	--	38	24	1.1	.4	.01	.03	70	6	2	40	50	268	261	480	210	44	.6
HC-6	No Name	(D-34-11)29CDC-S1	374859110433100	75-08-04	200MNCS	.01	15.0	16	290	52	180	6.5	254	--	1100	9.9	.02	.5	.01	.03	110	0	1	40	10	1780	2050	2200	940	730	2.6
HC-8	Honey Pot	(D-36-11) 6ACA-S1	374238110442400	75-08-17	221MRSN	.01	25.0	11	190	260	300	13	405	--	1800	15	.14	.4	.00	.00	120	1	1	170	10	2790	3000	3000	1500	1200	3.3
HC-15	Mill Race	(D-36-11)32CAD-S1	373754110430901	75-08-17	111ALVM	< .01	25.0	16	360	130	520	11	152	--	2200	48	3.4	.6	.00	.00	150	0	2	180	10	3380	3520	4000	1400	1300	6.0
Bf-4	Airplane	(D-32-10)21CCC-S1	380006110491200	75-08-14	111CLVM	.05	11.0	22	100	19	19	.4	203	--	100	61	.72	.4	.01	.03	80	1	2	10	10	425	445	700	330	160	.5
Bf-6	Roadside	(D-32-10)30AAA-S1	380001110503000	75-08-14	111CLVM	.02	17.5	25	120	42	53	.9	305	--	240	43	.01	.9	.00	.00	150	1	1	40	10	675	681	1000	470	220	1.1
Bf-9	Elk Head	(D-32-10)33BCD-S1	375848110490600	75-08-15	111CLVM	.17	8.0	13	59	9.4	8.1	.4	182	--	53	4.4	.13	.5	.00	.00	60	1	2	10	0	238	244	390	190	37	.3
Bf-11	Pine	(D-33-10) 4BCB-S1	375804110491100	75-07-08	111CLVM	.13	8.0	13	61	7.5	8.0	.7	171	--	40	4.8	.39	.3	.02	.06	40	0	7	0	0	241	215	360	180	43	.3
Bf-12	Pennell Igneous	(D-33-10) 9BBC-S1	375707110491600	76-07-26	120TRTR	.13	10	14	47	4.1	7.8	.2	116	--	55	1.9	.12	.6	.01	.03	120	3	0	0	0	188	184	275	130	39	.3
Bf-21	Cass Reservoir	(D-33-11)32ACD-S1	375339110433200	75-08-02	120TRTR	.15	8.0	14	46	8.0	10	.5	125	--	52	2.5	.07	.5	.01	.03	120	3	2	0	10	196	210	320	150	45	.4
Bf-32	Egg Nog	(D-35-10)18BAD-S1	374610110510100	59-04-26	221MRSN	--	--	12	57	16	--	--	187	7.5	175	16	--	.2	--	--	60	--	--	--	--	441	--	674	208	55	2.1
-32				75-08-19	221MRSN	< .01	15.0	13	55	17	67	1.3	189	--	170	14	.19	.3	.05	.15	70	1	1	30	0	432	425	700	210	52	2.0
Bf-37	Four Mile	(D-35-10)33DBC-S1	374305110484200	76-08-31	221MRSN	<.01	19	8.3	26	23	280	4.0	371	8.2	440	12	.13	.6	.00	.00	130	3	0	190	0	978	971	1460	160	0	9.6
Bf-38	Clay Seep	(D-35- 9)26BBB-S1	374432110533501	59-04-26	217CKR	--	--	16	26	10	--	--	293	8.0	72	11	--	.4	--	--	60	--	--	--	--	383	--	608	107	0	4.3
Hl-1	Bitter Spr. Creek	(D-33- 8)27BBB-S1	375458111011901	75-08-21	211EMRY	.02	23	7.3	84	94	30	3.5	293	--	390	4.9	.02	.2	.01	.03	80	1	1	40	10	759	734	910	600	360	0.5
Hl-7	Swap Canyon	(D-33- 8)36ACA-S1	375355110582500	75-08-20	211FMRY	.01	23.0	12	520	830	1000	7.3	671	--	6000	130	.03	.3	.00	.00	820	1	2	450	20	8830	11000	>8000	4700	4200	6.3
LC-1	Dove	(D-36- 9)10ACC-S1	374135110542800	75-08-19	211DKOT	<.01	19.0	22	330	180	160	9.5	287	--	1500	45	.04	.3	.00	.00	170	4	1	140	290	2390	2560	2800	1600	1300	1.8
LC-2	Berts	(D-36- 9)10DCB-S1	374114110542801	59-04-26	217BCKR	--	--	14	79	41	--	--	269	7.7	246	22	--	.4	--	--	120	--	--	--	--	--	--	855	365	144	1.5
-2				75-08-19	211DKOT	<.01	21.0	18	85	49	70	6.7	294	--	280	27	.02	.4	.01	.03	130	0	3	80	60	681	703	975	410	170	1.5

1) Abbreviations for geologic units: ALVM = Alluvium; CLVM = Colluvium; BCKR = Buckhorn conglomerate of Stokes (1944); CRML = Carmel; OKOT = Oakota; EMRY = Emery; ENRO = Entrada; FRRN = Ferron; MNCS = Mancos; MRSN = Morrison; MVRO = Mesaverde; NVJO = Navajo; PTOO = Pediment, terrace, or deposits; TRTR Tertiary undivided; WNGT = Wingate

Shelf Spring (LR-2) yields good water, 268 mg/l, from the Carmel; and even the water from Egg Nog Spring (Bf-32) from the Morrison is chemically acceptable at 432 mg/l.

Wells.

Chemical analyses of water from selected wells that draw water from the Entrada Sandstone or Navajo Sandstone are given in table 4.

Most of the wells that draw water from the Entrada are in or near Hanksville, in sections 15 and 16, T.28S., R.11E. Wells E 1,3,4,5, and 6 yield sodium bicarbonate-sulfate water with less than 500 mg/l dissolved solids, water which is soft to moderately hard. Well E 2, in section 16, yields calcium-sodium sulfate water of at least 1200 mg/l total solids. Well E 2 is a little deeper (407 feet vs 290 to 363) than the other wells and it, like the E 8 well, may be getting minerals from the top of the underlying Carmel. Well E 9, in section 11, T.35S., R.11E., like most others in the Entrada, yields sodium bicarbonate-sulfate water.

Water drawn from the Navajo falls into two categories: dissolved solids in the range of 933 to 4200 and dissolved solids in the range of 188 to 442. Wells N 1,2,3, and 4, drilled north of the Fremont River in sections 29 and 33, T.28S., R.8E., are in the poorer category, perhaps because the water is contaminated by minerals from the overlying Carmel.

The other five wells that draw the better-quality water from the Navajo are scattered among five townships (table 3), from 29 to 36 south, on both sides of the mountains. The analyses show that the waters are not very similar: N 5 and 9 are relatively high in calcium, N 7 and 9 in magnesium, N 8 in sodium (so that it is low in hardness), N 5 and 7 in bicarbonate, N 9 in sulfate, and N 5 in chloride. Despite the diversity of dissolved constituents, all these waters are of acceptable quality.

TABLE 3. - RECORDS OF SELECTED WELLS THAT DRAW WATER FROM ENTRADA SANDSTONE OR NAVAJO SANDSTONE, HENRY MOUNTAINS AREA.

(LOCATIONS OF WELLS ARE PLOTTED ON FIGURE 6. CHEMICAL ANALYSES OF WATERS FROM THESE WELLS ARE GIVEN IN TABLE 4.)

MAP NUMBER	OWNER	LOCAL NUMBER 1/	STATION NUMBER	DEPTH DRILLED FEET	DEPTH OF WELL FEET	CASING DIAMETER INCHES	DEPTH CASED	DEPTH TO FIRST OPENING	PRINCIPAL AQUIFER	DEPTH TO AQUIFER	ALTITUDE LAND SURFACE	WATER LEVEL FEET 2/	DISCHARGE GPM 3/	DRAW DOWN FEET	SPECIFIC CAPACITY GPM/FT	PUMPING PERIOD HOURS	DATE OF COMPLETION	USE OF WATER
E1	JIM-N-ELLS CORP.	(D28-11)15BDC- 1	382229110422201	290	290	7.	265	265	221ENRD	40	434D	4D.DO+	60	48	1.3	24.0	4-24-73	CUL,IRR
E2	BULLARD, D E	(D28-11)16CBA- 1	382224110433501	4D7	4D7	6	4D2	4D2	221ENRD	387	4316	2D.DD+	16	214	0.1	8.0	9- 5-68	CUL,IRR
E3	STAGECOACH MOTEL	(D28-11)16DAC- 1	382220110425501	34D	340	9.63	335	3D5	221ENRD	95	4310	23.6D+	13	--	--	--	--	CULINARY
E4	US FED AVIA ADM	(D28-11)16DAD- 1	382220110424601	35D	35D	8.63	35D	327	221ENRD	68	43D5	2D.7D+	32	15D	0.2	2.0	7-14-63	CULINARY
E5	US GRAZING SERVICE	(D28-11)16DCA- 1	3822D911D425901	34D	34D	6.25	195	--	221ENRD	30	4318	19.90+	4 F	--	--	--	12-21-38	PUBLIC
E6	HANKSVILLE CANAL CO	(D28-11)16DDB- 1	382210110424201	332	332	1	332	292	221ENRD	25	4315	4D.DD+	5 F	--	--	--	8-17-34	PUBLIC
E7	US BUR LAND MANAGE	(D28-11)21A8D- 1	382153110430601	363	363	6	363	353	221ENRD	30	4320	F	19	--	--	8.D	11-19-66	CULINARY
E8	ENERGY FUELS, INC	(D29-11)36DAA- 1D	381431110392501	5DD	5D0	6	458	312	221ENRD	26D	4795	18D.62+	15	--	1.3	--	6-3D-51	UNUSED
E9	SHITAMARING MINE	(D35-11)16CDD- 1	374527110421201	--	560	--	--	--	221ENRD	--		--	35	--	--	CONT.	1969	IND,CUL
N1	US BUR LAND MANAGE	(D28- 8)29CDC- 1	382D241110430D1	764	764	13.38	720	72D	220NVJO	72D	494D	69.9D+	1D0	--	--	--	8- 7-55	STOCK
N2	GARKANE POWER ASSN	(D28- 8)29DCB- 1	382D271110416D1	761	761	16	679	679	220NVJO	668	4897	1D8.0D+	3110	--	--	27.4	1-25-74	UNUSED
N3	IPP TEST WELL	(D28- 8)338BB- 1	382D2D110346D1	1685	125D	2D	7D4	7D4	22DNVJO	7D9	4884	119.0D+G	28D0	512	5.5	84D.D	8-30-75	UNUSED
N4	IPP-COLT TEST	(D28- 8)33CDD- 15	381934110323D2	140D	135D	13.63	14DD	1286	22DNVJO	745	4823	183.5D+	2D0 F	--	--	D.3	1975	UNUSED
N5	US BLM (USGS #3)	(D29-12)33ACD- 2	38144D1103628D1	510	--	--	--	D	220NVJO	21D	4616	14D.9D	2D0	--	--	8.D	8-1D-76	
N6	WEAVER, ROBERT	(D31- 7)36DAD- 15	38D354111D446D2	6648	23D5	10.75	23D5	58D	22DNVJO	580	5361	3D5.0D	55	--	--	--	1969	IRR,CUL,STK
N7	PDI5ON WELL (US BLM)	(D31-12) 4BDB- 1	38D859110354801	--	45D	--	--	--	22DNVJD	--	49DD	--	12	--	--	--	1958	STOCK
N8	SHITAMARING MINE	(D35-11)16DCD- 1	374531110420D1	--	1DDD	8.DD	--	--	220NVJO	--		140.0D	75	--	--	CONT.	1976	IND,CUL
N9	RDMEX No. 1 FED.	(D36-10)21BDB- 1	374D0D110491501	3043	--	4.5D	3D43	2996	220NVJO	--	3956	F	350	--	--	--	8-18-69	UNUSED

1/ Codes indicate: D, deepened; 5, plugged back; 1, first well; 2, second well on the ten-acre tract.

2/ Measured in feet below land surface. Measurements followed by + are above land surface. F indicates a flowing well. G indicates use of pressure gage.

3/ Discharge followed by F indicates a flowing well.

TABLE 4. - CHEMICAL ANALYSES OF WATER FROM SELECTED WELLS THAT DRAW WATER FROM ENTRADA SANDSTONE OR NAVAJO SANDSTONE, HENRY MOUNTAINS AREA.

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY
MULTIPLE STATION LISTING

MAP NUMBER	OWNER	LOCAL NUMBER	STATION NUMBER	DATE OF SAMPLE	TEMPERATURE (DEG C) (00010)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED CALCIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NESIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	DIS-SOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	PH (UNITS) (00400)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED CHLORIDE (CL) (MG/L) (00940)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED FLUORIDE (F) (MG/L) (00950)	DIS-SOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)	DIS-SOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	HARDNESS (CA,MG) (MG/L) (00900)	NON-CARBONATE HARDNESS (MG/L) (00902)	SODIUM ADSORPTION RATIO (00931)
E1	JIM-N-ELLS CORP.	(028-11)15B0C- 1	382229110422201	75-12-06	--	13	11	5.0	120	1.3	236	7.3	110	2.7	0.02	0.4	.00	.00	230	--	--	--	--	380	--	--	48	0	7.5
E2	BULLARO, O E	(028-11)16C8A- 1	382224110433501	69-05-28	--	14	99	35	220	3.0	159	8.0	758	21	--	.2	--	--	350	10	0	--	160	1308	--	1980	390	260	4.8
E2				76-07-26	--	12	100	36	230	3.3	154	7.4	730	7.6	.43	.2	.01	.03	920	--	--	--	--	1200	--	1560	400	270	5.0
E3	STAGECOACH MOTEL	(028-11)16OAC- 1	382220110425501	55-05-19	--	7.5	21	.0	--	--	245	--	165	6.0	--	.4	--	--	--	--	--	--	--	--	441	--	54	0	--
E3				64-01-07	E11.0	14	15	8.0	130	1.5	235	8.2	133	9.0	--	.3	--	--	190	0	0	--	30	426	--	605	70	0	6.7
E4	US FEO AVIA AOM	(028-11)16OAO- 1	382220110424601	64-01-31	--	11	11	5.0	120	1.7	236	8.4	109	7.0	--	.4	--	--	170	0	0	--	40	405	--	660	50	0	7.5
E4				65-09-13	--	--	--	--	--	--	--	8.3	--	--	.02	--	--	--	--	--	--	--	--	397	--	650	--	--	--
E4				75-06-10	--	13	19	5.3	120	1.5	238	--	130	3.5	--	.4	.01	.03	150	--	--	--	--	410	--	657	69	0	6.3
E5	US GRAZING SERVICE	(028-11)16OCA- 1	382209110425901	47-03-16	--	--	15	14	--	--	238	--	130	8.0	--	.7	--	--	--	--	--	--	--	--	--	617	95	0	--
E6	HANKSVILLE CANAL CO	(028-11)16OOB- 1	382210110424201	47-03-16	--	--	10	8.7	--	--	236	--	119	4.0	--	.7	--	--	--	--	--	--	--	--	--	588	61	0	--
E6				51-12-11	--	16	18	.0	--	--	243	--	109	3.0	--	.0	--	--	--	--	--	--	--	--	--	380	--	43	0	--
E6				62-05-29	--	--	--	--	--	--	214	8.6	112	3.0	--	--	--	--	--	--	--	--	--	--	--	372	605	46	0	7.9
E7	US BUR. LAND MANAGE	(028-11)21A8O- 1	382153110430601	75-06-10	--	12	9.8	2.8	110	1.2	228	--	90	2.6	.01	.3	.01	.03	110	--	--	--	--	341	--	528	36	0	8.0
E8	ENERGY FUELS, INC	(029-11)36OAA- 1O	381431110392501	76-09-22	--	7.5	120	70	460	7.6	104	7.9	1400	19	.07	.2	.00	.00	240	--	--	--	--	2140	--	2950	590	500	8.3
E9	SHITAMARING MINE	(035-11)16COO- 1	374527110421201	76-08-30	20	15	21	12	83	5.5	177	8.4	130	8.1	.78	.3	--	--	70	3	6	100	30	369	368	610	100	0	3.6
N1	US BUR LAND MANAGE	(028- 8)29COC- 1	382024111043001	76-06-16	--	10	126	50	520	5.0	291	8.2	618	463	--	.4	--	--	340	1	0	--	0	1940	2000	3000	520	280	9.9
N2	GARKANE POWER ASSOC.	(028- 8)29OCB- 1	382027111041601	74-10-04	24	13	284	88	494	4.4	--	7.8	1070	625	--	.4	--	--	280	--	--	--	--	--	3746	4200	1070	--	6.6
N3	IPP TEST WELL	(028- 8)33B8B- 1	382020111034601	75-11-24	17.5	9.3	95	28	760	3.7	289	7.0	660	800	.01	.7	.00	.00	530	--	--	--	--	2500	--	4050	350	120	18
N4	IPP-COLT TEST	(028- 8)33COO- 1S	381934111032302	75-08-21	17.5	9.6	110	52	130	5.6	225	7.0	380	130	.01	.2	.00	.00	60	--	--	--	--	933	--	1400	490	310	2.6
N5	US BLM (USGS #3)	(029-12)33ACO- 2	381440110362801	76-08-09	16.5	11	59	31	26	7.5	239	7.5	110	15	.06	.2	.00	.00	40	--	11	--	20	378	--	640	280	79	.7
N6	WEAVER, ROBERT	(031- 7)36OAO- 1S	380354111044602	75-08-29	17.5	9.6	32	20	6.5	2.0	175	7.1	27	2.8	.27	.1	.01	.03	30	--	--	--	--	188	--	350	160	19	.2
N7	POISON WELL (US BLM)	(031-12) 4B0B- 1	380859110354801	75-07-28	--	10	26	43	18	3.9	245	--	67	7.6	.01	.2	.01	.03	30	0	12	20	560	297	305	510	240	41	.5
N8	SHITAMARING MINE	(035-11)16COO- 1	374531110420001	76-08-30	21.0	15	13	11	55	4.6	153	8.5	60	8.0	.73	.2	.01	.03	70	5	4	80	110	250	237	400	78	0	2.7
N9	ROMEX NO.1 FEO.	(036-10)21B0B- 1	374000110491501	69-07-31	--	9.7	53	40	17	5.9	110	7.7	229	10	--	.3	--	--	150	--	--	--	--	442	444	629	296	206	.4

TABLE 5. - CHEMICAL ANALYSES OF WATER FROM SELECTED STREAMS, HENRY MOUNTAINS AREA.

(LOCATIONS OF SAMPLE SITES ARE PLOTTED ON FIGURE 6.)

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DRAINAGE	ALTITUDE	LOCAL NUMBER	STATION NUMBER	DATE OF SAMPLE	INSTANTANEOUS DISCHARGE (CFS) (00061)	TEMPERATURE (DEG C) (00010)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED CALCIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NESIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	DIS-SOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	PH (UNITS) (00400)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED CHLORIDE (CL) (MG/L) (00940)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED FLUORIDE (F) (MG/L) (00950)	DIS-SOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)	DIS-SOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	HARDNESS (CA,MG) (MG/L) (00900)	NON-CARBONATE HARDNESS (MG/L) (00902)	SODIUM ADSORPTION RATIO (0093I)
PLEASANT CREEK UPPER	5910	(0-30- 7)29A8A	381047111104900	75-08-23	9.	23.5	24	28	13	4.4	1.8	121	--	25	1.7	0.00	0.1	.03	.09	20	1	0	0	0	158	162	239	120	24	0.2
PLEASANT CREEK LOWER	5030	(0-29- 7)25BCC	381529111070900	75-08-23	2.	26.	27	190	51	32.	4.7	216	--	540	6.4	0.01	0.3	.01	.03	130	3	1	30	10	958	1000	1200	680	510	0.5
OUGOUT CREEK	8880	(0-31-10)29D0O	380426110492200	75-07-29	0.5	9.	9.1	56	4.6	4.1	0.7	138	--	44	0.9	0.41	0.2	.00	.00	10	0	2	0	10	189	197	320	160	46	0.1
CEDAR CREEK	7020	(0-31- 9)12B8C	380742110522901	76-07-30	0.33	26	14	52	6.6	7.8	0.5	122	--	62	4.5	0.12	0.2	.00	.00	50	1	7	0	0	208	204	325	160	57	0.3
OAK CREEK	5700	(0-30-10)20CBA	381121110513400	75-07-27	2.	11.5	20	88	14	16	0.4	196	--	100	15	0.01	0.4	.02	.06	80	0	1	0	0	351	350	550	280	120	0.4
BIRCH CREEK UPPER	6650	(0-30-10)27A0C	381030110484000	75-07-11	.17	18.	19	64	8.6	13	0.7	182	--	56	5.1	0.01	0.3	.02	.06	50	1	2	0	0	257	236	385	200	46	0.4
BIRCH CREEK MIDDLE	6380	(0-30-10)23CCC	381052110482 3	76-08-02	.13	22.	17	45	9.4	13	0.8	140	--	58	5.3	0.02	0.3	.00	.00	70	0	0	0	0	218	208	330	150	36	0.5
BIRCH CREEK LOWEST	5880	(0-30-10 23A8B	381040110474 9	76-08-02	.05	27.	18	33	8.3	13	0.8	104	--	59	5.4	0.09	0.3	.00	.00	50	0	0	0	0	190	183	285	120	31	0.5
BULL CREEK	5380	(0-30-11)18DA8	381157110450 8	75-07-28	3.00	18.	13	65	14	13	1.0	170	--	93	4.2	0.03	0.2	.01	.03	40	1	2	0	10	287	307	480	220	81	0.4
FAIRVIEW DITCH	5300	(0-30-11)17BA8	381225110443701	76-08-03	1.40	23.	13	67	15	15	0.9	99	--	120	5.2	0.02	0.2	.00	.00	50	0	0	10	10	285	301	480	230	150	0.4
GRANITE CREEK	8960	(0-31-10)26A8B	380518110463200	75-07-29	.48	7.	8.8	38	2.6	3.2	0.6	116	--	18	0.7	0.02	0.1	.00	.00	10	0	4	0	0	129	137	220	110	10	0.1

Streams.

The chemical analyses of water collected from eleven sites on seven streams are given in table 5.

Pleasant Creek, which drains off the east slope of Boulder Mountain, west of the Henry Mountains area, was sampled in its upper reaches near Pleasant Creek Ranch and then after it had passed through the Notom area. The increase in dissolved solids from 158 mg/l to 958 mg/l probably can be attributed to return flow from irrigation to the Notom area.

All other creeks whose waters were analyzed head in the Henry Mountains. They are spring fed and all the waters are of excellent chemical quality though all are moderately hard to very hard.

Sampling of the water of Birch Creek, which flows northward off the north slope of Mt. Ellen, in 1975 and 1976 showed that Birch Creek loses nearly half its calcium carbonate as it flows over the fan north of the mouth of its canyon. This loss appears to be due to the fact that as the temperature of the water rises downstream, the water loses dissolved carbon dioxide and thus some calcium carbonate is precipitated. We don't know whether or not this phenomenon occurs with other spring-fed streams, but it seems a likely event. Discharge and conductance measurements of Birch Creek made on July 2, 1977, indicated that the same downstream decrease in calcium carbonate was still occurring.

The details of the investigation of the loss of calcium carbonate by Birch Creek are given in Appendix F.

CONCLUSIONS and RECOMMENDATIONS

Conclusions

Observations during the 1975 and 1976 field seasons, after winters of normal precipitation, and during the 1977 field season, after a dry winter, confirm that springs and the mountain streams fed by them cannot be depended upon as water supplies. Therefore any major development of coal will have to depend on water from underground supplies.

The water requirements for major development of coal would include 100 to 150 gallons per day per person, water for plant maintenance and revegetation of perhaps 1000 acre-feet per year, plus water for the kind of coal development based on these approximate demands:

1) Coal gasification — 10,000 to 45,000 acre-feet per year for plant producing 250 million cubic feet of gas per day.

2) Coal liquefaction — A plant producing 100,000 barrels of liquid per day requires about 24,000 acre-feet of water per year.

3) Transshipment by slurry pipeline — 750 acre-feet per million tons of coal (a 1000-megawatt generating plant requires 3 to 3½ million tons of coal and 2250 to 2600 acre-feet of water for shipping per year).

4) Cooling for generating plant — a 1000-megawatt generator consumes about 15,00 acre-feet of water per year.

Water to meet these requirements may be available from the following sources:

1) In years of normal or excessive precipitation water from springs by pipeline in amounts of 200 to 400 acre-feet per year. Measurements of springs after the dry winter of 1976-77 prove that springs are not dependable and therefore any use dependent on springs would require a back-up source of water.

2) Water from the Navajo Sandstone might support properly-spaced wells in a field that would yield 20,000 to 30,000 acre-feet per year. Water from the Navajo in this and other areas may be

of excellent to poor chemical quality and thus may require treatment before use.

3) Water from shallow aquifers such as the Mesaverde, Emery, Ferron, Morrison, or Entrada might supply limited quantities of perhaps 2000 to 3000 acre-feet per year. Water samples collected from these formations during this investigation suggest that water from these sources is of poor or variable chemical quality and therefore may require treatment before it can be used.

4) Water imported from Oak Creek and/or Pleasant Creek might supply 2000 to 3000 acre-feet per year if water rights can be purchased from present owners. Although these creeks were not looked at in 1977 it is likely that the general drought caused both to have low flow: likely these sources of water would be no more dependable than the springs in the Henry Mountains.

Recommendations

We recommend that any plan for coal development include the firming up of a dependable supply of water early in the planning stage. Because surface water supplies are meagre and undependable, the only possible local source of water is underground. Therefore we recommend that test wells be drilled in any area where coal is to be developed. These wells should test each penetrated aquifer for yield and chemical quality. If the water is to be used for drinking it should also be tested for bacteria. Holes that are collared on Tarantula Mesa should successively test the Mesaverde, Emery, Ferron, Morrison, Entrada, and Navajo; holes that are collared below Tarantula should test all the above-named units that are penetrated. The depths at which these formations are penetrated will depend on location: a well drilled on top of Tarantula should reach the top of the Navajo at about 5700 feet; a well drilled on Wildcat Mesa should reach the top of the Navajo at about 4500 feet.

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We are especially grateful to Harold Ekker and to Reo Hunt of Hanksville, for they several times helped us to keep our ancient field vehicle capable of moving. In particular we are grateful for the help we received on Sunday July 3, 1977 when we limped into Hanksville at about 11:30 in the morning with a severe crack in the frame of our carryall. In less than two hours we were out of Hanksville, heading for the mountains, only because Reo Hunt was able to arrange for swift welding of the crack.

Charles Wier, of AMAX Coal Company, graciously provided us with logs of the test holes drilled by AMAX in 1972, and permitted us to release the information given in Appendix C. Ben Law, of Conservation Division, U.S. Geological Survey, gave us information about the test drilling he supervised in 1976.

The difficult typing of this report was done mostly by Vickie Beesley, with some very timely assists by Connie Wiscombe. We are most grateful to both for their help.

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We are also grateful to Dorothy Boulton of the State Engineer's Office for providing expert guidance through the records of that office.

APPENDICES

A. Records of springs in the Henry Mountains area

B. Discharge estimates (E) or measurements (M) on selected streams in the Henry Mountains area, 1975-1977

C. Test drilling by AMAX Coal Company, by Conservation Division, U.S. Geological Survey, and for uranium exploration

D. Cross-channel profiles of selected streams that drain the coal basin

E. Grain-size analyses and porosity determinations of surface samples from selected sandstones

F. Birch Creek and its downstream loss of calcium carbonate

APPENDIX A

Table 6. - Records of Springs in the Henry Mountains area.

The appended 209 spring schedules are arranged by drainage area, clockwise around the Henry Mountains, beginning in the northwest with Sandy Creek (SC), which flows into the Fremont, and ending in the southwest with Halls Creek, which flows into Lake Powell. Within each drainage the springs are listed in upstream-to-downstream order by subdrainage, beginning with the highest. Each spring is also shown on the map of figure 6.

Measurements of flow of the springs were made with tarp, bucket, and stopwatch, as described under Methods of Work. Measurements of conductance were made with a Beckman meter in 1975 and with Beckman and Hach meters (both used at each site) in 1976 and 1977. Temperatures were measured with mercury thermometers.

Most entries on the schedules are self-explanatory. Abbreviations used: M = measured, E = estimated, R = reported, C = chemical analysis available in table 2. Spring numbers are coded according to main drainage:

Springs	Drainage	Page
SC-1 to SC-7	Sandy Creek	A-1
Sw-1 to Sw-52	Sweetwater Creek	A-2 to A-8
TW-1 to TW-6	Town Wash	A-9
BC-1 to BC-6	Birch Creek	A-10
SaW-1	Sand Wash	A-10
Bu-1 to Bu-12	Bull Creek	A-11, A-12
DV-1 to DV-2	Dry Valley Wash	A-12
BG-1 to BG-9	Beaver-Granite	A-13, A-14
PB-1 to PB-6	Poison-Butler	A-14
NW-1 to NW-13	North Wash	A-15, A-16
TC-1 to TC-22	Trachyte Creek	A-17 to A-19

LR-1 to LR-6	Little Rockies - streams that drain southeastward from	A-20
HC-1 to HC-17	Hansen Creek	A-21 to A-23
Bf-1 to BF-39	Bullfrog Creek	A-24 to A-28
LC-1 to LC-3	Long Canyon	A-29
H1-1 to H1-8	Halls Creek	A-30

A comparison of the flows of springs measured in 1977 with flows of the same springs measured in 1975 or 1976 gives a fair indication of the effect of the drought during the winter of 1976-77. For convenience the springs revisited in 1977 are listed below, along with the pertinent measurements (M) or estimates (E).

Map #	Spring Name	Yield in 1977 gpm	Yield in 1975 or 1976 gpm
SW-1	Igneous	<1E	3M
SW-9	Willow East	<1E	3-4E
SW-10	Willow Wildlife	23M	110 and 120M
SW-11	McMillan	1M	3M
SW-12	Birch	1-2E	8-10E
SW-23	Corral Point	15M	32M
SW-29	North (South) Fork	<1E	50 and 70M
TW-2	Lost Spring	2E	Dry
TW-3	Lower Lost Spring	5 1/2M	9M
BC-6	Bert Avery	1M	1E
BU-5	Birch	8M	13M
BU-6	McClellan Wash	20M	23M
TC-1	Box	<1 pt M	1 pt to 1 qt M
TC-5	Hancock	1.5M	6.7 and 10M
TC-8	Tank	2.4M	5M
TC-10	Browns Hole	<1E	36M
TC-15	Benson	100M	170M
TC-21	Starr Spring overflow	None	11, 43, and 85M
BF-11	Pine	1.8M	40 and 60M
BF-19	Pennell	4.8M	25-30E
BF-20	Sackett	15-20E	15-20E
BF-21	Cass Reservoir	20M	48 and 60M
BF-33	Indian	<1/4E	1/4E
BF-34	Cow Seeps	1 1/4M	1M

Reference Number SC-1 | Spring Schedule Henry Mountains Region | Name Divide Canyon
Quadrangle Wagon Box
Drainage Sandy Creek | Coordinates (D33-8)2ccd
Sub-drainage Divide Canyon | County Garfield
Ident. # (Lat.) 37 57 39 (Long.) 111 00 03 | Owner
Topography Near bottom of steep canyon about 300 feet below the rim of Tarantula Mesa
Altitude 5980 | Openings
Formation (or kind of rock) Sandstone on grey sandy shale in Mesaverde
Improvements, use Stock
Discharge 5-10 gpm cfs M, (E), R, Temperature 14 °C 58 °F
Conductance 1500 m mhos pH
Date of record 8/13/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/13/75

Reference Number SC-2 | Spring Schedule Henry Mountains Region | Name Spring Canyon
Quadrangle Notom
Drainage Sandy Creek | Coordinates (D32-8)21dba
Sub-drainage Spring Canyon | County Garfield
Ident. # (Lat.) 38 00 41 (Long.) 111 01 56 | Owner
Topography Stream channel upstream from hogbacks of Emery Sandstone
Altitude 5500 | Openings Several
Formation (or kind of rock) Emery Sandstone through alluvium **
Improvements, use Stock
Discharge 2 gpm cfs M, (E), R Temperature 20 °C °F
Conductance * 2975 m mhos 7.1 pH
Date of record 197S 9/1/ 1976 Recorded by H. D. Goode
Remarks:
* Hach meter measured 3150
** Water may come from contact with Masuk Ss.
C 9/1/76
Salt cedar, red paintbrush, tall grass

Reference Number SC-3 | Spring Schedule Henry Mountains Region | Name Bank Spring
Quadrangle Notom
Drainage Sandy Creek (Mainstream) | Coordinates (D31-8)7ada
Sub-drainage | County Garfield
Ident. # (Lat.) 38 07 38 (Long.) 111 03 38 | Owner
Topography West bank Sandy Creek
Altitude 5120 | Openings
Formation (or kind of rock) Alluvium over Entrada
Improvements, use none; stock
Discharge 4-5 gpm cfs M, (E), R, Temperature 14 °C °F
Conductance 2700 m mhos pH
Date of record 8/23/197S 1976 Recorded by H. D. Goode
Remarks:
Water from sandy alluvium over Entrada. Alluvium probably derived mostly from Carmel.

Reference Number SC-4 | Spring Schedule Henry Mountains Region | Name False Spring
Quadrangle Notom
Drainage Sandy Creek | Coordinates (D31-7)1bcb
Sub-drainage Fivemile Wash | County Garfield
Ident. # (Lat.) 38 08 43 (Long.) 111 05 39 | Owner
Topography Canyon immediately below outcrop of Navajo.
Altitude 5240 | Openings
Formation (or kind of rock)
Improvements, use
Discharge None gpm cfs M, E R Temperature 16 °C °F
Conductance 235 m mhos pH
Date of record 8/23/1975 1976 Recorded by H. D. Goode
Remarks:
Rainwater appears to collect in what may be a large pothole or plunge-pool partly filled with alluvium. No sign that water is issuing from bedrock or alluvium. This pseudo-spring is noted only because it appears on the BLM maps as Fivemile Spring.

Reference Number SC-5 | Spring Schedule Henry Mountains Region | Name Cottonwood Spring
Quadrangle Notom
Drainage Sandy Creek | Coordinates (D30-8)31abc
Sub-drainage Cottonwood Wash | County Wayne
Ident. # (Lat.) 38 09 52 (Long.) 111 05 27 | Owner
Topography In wash near outcrops of Carmel
Altitude 5150 | Openings
Formation (or kind of rock) Alluvium
Improvements, use
Discharge 0 gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 8/23/197S 1976 Recorded by H. D. Goode
Remarks:
No Water
Contorted beds of gypsum, shale, mudstone.
Small grove of cottonwoods.

Reference Number SC-6 | Spring Schedule Henry Mountains Region | Name Burro Spring
Quadrangle Notom
Drainage Sandy Creek | Coordinates (D30-8)32aaa
Sub-drainage Burro Wash | County Wayne
Ident. # (Lat.) 38 09 55 (Long.) 111 03 55 | Owner
Topography In wash below junction of Fivemile and Burro Washes
Altitude 5040 | Openings
Formation (or kind of rock) Alluvium
Improvements, use Stock
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 8/23/ 197S 1976 Recorded by H. D. Goode
Remarks:
Looked at from distance, did not visit.
Vegetation: Abundant Phreatophytes

Reference Number SC-7 | Spring Schedule Henry Mountains Region | Name Blind Trail Spg
Quadrangle Notom
Drainage Sandy Creek | Coordinates (D31-8)27dab
Sub-drainage Blind Trail Wash | County Garfield
Ident. # (Lat.) 38 04 50 (Long.) 111 00 31 | Owner
Topography Blind Trail Canyon
Altitude 5520 | Openings
Formation (or kind of rock) Sandstone - Emery
Improvements, use Trough; stock
Discharge * gpm cfs M, E, R, Temperature 19 °C °F
Conductance 2700 m mhos pH
Date of record 8/22/197S 1976 Recorded by H. D. Goode
Remarks:
C 8/22/75
* 7/17/76 a few drops/minute
* 8/5/76 40-50 drops/minute
Cottonwoods in canyon

Reference Number Sw-1 — Spring Schedule Henry Mountains Region

Name Igneous
Quadrangle Mt Ellen
Coordinates (D32-10)8bdc
County Carfield
Owner

Drainage Sweetwater
Sub-drainage D & D
Ident. # (Lat.) 38 02 19 (Long.) 110 50 05
Topography Canyon bottom

Altitude 8160 Openings
Formation (or kind of rock) colluvium on igneous rock
Improvements, use
Discharge 3 gpm cfs (M), E, R, Temperature 15 °C °F
Conductance 440 m mhos pH
Date of record 8/14/1975 1976 Recorded by H. D. Goode
Remarks:
75 C 8/14/75

7/15/76 23°C 420 mmho; measured about 200 ft. above road, nearly 1/3 mile below spring.

7/4/77 14°C 460mmho <1gpm E - Raining

Reference Number Sw-2 — Spring Schedule Henry Mountains Region

Name Six Callon Spg
Quadrangle Mt Ellen
Coordinates (D32-10)8cbd
County Carfield
Owner

Drainage Sweetwater Creek
Sub-drainage D & D
Ident. # (Lat.) 38 02 03 (Long.) 110 50 08
Topography South - facing slope

Altitude 7880 Openings
Formation (or kind of rock) colluvium over Tununk shale
Improvements, use
Discharge 6 gpm cfs (M), E, R Temperature 13 °C °F
Conductance 1250 m mhos pH
Date of record 8/14/1975 1976 Recorded by H. D. Coode
Remarks:
C 8/14/75

Reference Number Sw-3 — Spring Schedule Henry Mountains Region

Name D & D - B
Quadrangle Mt Ellen
Coordinates (D32-10)18aaa
County Carfield
Owner

Drainage Sweetwater
Sub-drainage D & D
Ident. # (Lat.) 38 01 49 (Long.) 110 50 29
Topography Colluvium south side of channel

Altitude 7620 Openings 2
Formation (or kind of rock) Colluvium
Improvements, use
Discharge 15 gpm cfs (M), E, R, Temperature 15 °C °F
Conductance 640 m mhos pH
Date of record 8/15/1975 1976 Recorded by H. D. Goode
Remarks:
Vegetation: ponderosa grove

Reference Number Sw-4 — Spring Schedule Henry Mountains Region

Name D & D - A
Quadrangle Mt Ellen
Coordinates (D32-10)18cba
County Carfield
Owner

Drainage Sweetwater
Sub-drainage D & D
Ident. # (Lat.) 38 01 21 (Long.) 110 51 20
Topography Canyon bottom

Altitude 6880 Openings
Formation (or kind of rock) thin ss in Tununk Shale
Improvements, use
Discharge 1/4 gpm cfs M, (E), R Temperature 15.5°C °F
Conductance 6500 m mhos pH
Date of record 8/14/1975 1976 Recorded by H. D. Goode
Remarks:
C 8/14/75

Reference Number Sw-5 — Spring Schedule Henry Mountains Region

Name South Fork - A
Quadrangle Mt Ellen
Coordinates (D32-10)4bca
County Carfield
Owner

Drainage Sweetwater
Sub-drainage South Creek - South Fork
Ident. # (Lat.) 38 03 19 (Long.) 110 49 09
Topography Swale in west slope Mt. Ellen

Altitude 9220 Openings
Formation (or kind of rock) Probably weathered igneous
Improvements, use Stock
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/16/ 1976 Recorded by H. D. Goode
Remarks:
Small pond in Swale, no flowing water

Reference Number Sw-6 — Spring Schedule Henry Mountains Region

Name South Fork - B
Quadrangle Mt Ellen
Coordinates (D32-10)4bcd
County Carfield
Owner

Drainage Sweetwater
Sub-drainage South Creek - South Fork
Ident. # (Lat.) 38 03 11 (Long.) 110 49 03
Topography Near head of South Creek

Altitude 9200 Openings
Formation (or kind of rock) Probably near contact of igneous over Blue Gate
Improvements, use Stock
Discharge < 1 gpm cfs M, (E), R Temperature 19 °C * °F
Conductance 410 m mhos pH
Date of record 9/11/1975 1976 Recorded by H. D. Goode
Remarks:
* 7/16/76 10° C 410 mmho 1/4 gpm E
Vegetation: Aspen

Reference Number Sw-7 — Spring Schedule Henry Mountains Region

Name North Fork - A
Quadrangle Mt Ellen
Coordinates (D31-10)33dba
County Garfield
Owner

Drainage Sweetwater
Sub-drainage South Creek - North Fork
Ident. # (Lat.) 38 03 56 (Long.) 110 48 36
Topography Creek Channel

Altitude 9600 Openings
Formation (or kind of rock) Diorite over Blue Cate Shale
Improvements, use
Discharge 30-40 gpm cfs M, (E), R, Temperature 12 °C °F
Conductance 285 m mhos pH
Date of record 7/29/1975 1976 Recorded by H. D. Goode
Remarks:

Reference Number Sw-8 nv — Spring Schedule Henry Mountains Region

Name
Quadrangle Mt Ellen
Coordinates (D31-10)32ddb
County Carfield
Owner

Drainage Sweetwater
Sub-drainage South Creek
Ident. # (Lat.) 38 03 42 (Long.) 110 50 07
Topography Steep slope

Altitude Openings
Formation (or kind of rock) Probably colluvium over Igneous
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by H. D. Goode
Remarks: 2/11/77
Did not visit - shows on BLM map and aerial photos.
May yield several gpm.
Vegetation: Ponderosa

Reference Number Sw-9 | Spring Schedule Henry Mountains Region | Name Willow East
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)32bcb
Sub-drainage South Creek - Willow
County Garfield
Ident. # (Lat.) 38 04 1D (Long.) 110 5D 22
Owner
Topography Spring issues beside Crk bottom

Altitude 853D Openings
Formation (or kind of rock) Colluvium over Blue Gate Shale
Improvements, use Stock
Oischarge 3-4 gpm cfs M, (E), R, Temperature 7 °C 45 °F
Conductance 1050 m mhos pH
Date of record 7/30/1975 1976 Recorded by H. D. Goode
Remarks:
C 7/30/75
7/3/77 Flow down to less than 1gpm E

Reference Number Sw-10 | Spring Schedule Henry Mountains Region | Name Willow Wildlife
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)31ada
Sub-drainage South Creek - Willow
County Garfield
Ident. # (Lat.) 38 04 13 (Long.) 110 50 26
Owner
Topography Swale near creek

Altitude 8500 Openings Several
Formation (or kind of rock) Colluvium over Blue Gate Shale
Improvements, use
Discharge 120* gpm cfs (M), E, R Temperature 8 °C 46 °F
Conductance 740 m mhos pH
Oate of record 7/30/1975 7/16/1976 Recorded by H. D. Goode
Remarks:
*7/16/76 7°C 680 mmho 11D gpm M
Vegetation: Willows
C 7/30/75
7/3/77 9.5°C 660mmho 23gpm M

Reference Number Sw-11 | Spring Schedule Henry Mountains Region | Name* McMillan Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)31abb
Sub-drainage South Creek
County Garfield
Ident. # (Lat.) 38 04 22 (Long.) 110 5D 54
Owner
Topography Gentle slope in campground

Altitude 8340 Openings
Formation (or kind of rock) Diorite (probably weathered) over Blue Gate Shale
Improvements, use Pipe, stock, water supply for campground
Oischarge 3** gpm cfs (M), E, R, Temperature 9 °C 48 °F
Conductance 750 m mhos pH
Oate of record 7/30/1975 7/16/1976 Recorded by H. D. Goode
Remarks:
*Also known as McClellan Spring
**7/16/76 10°C 780 mmho 2 gpm M
Vegetation: Ponderosa nearby
C 7/30/75
C 7/22/75
7/3/77 10°C 780mmho 1gpm M

Reference Number Sw-12 | Spring Schedule Henry Mountains Region | Name Birch Spring
Quadrangle Mt Ellen
Orainage Sweetwater
Coordinates (D32-10)6cda
Sub-drainage South Creek
County Garfield
Ident. # (Lat.) 38 02 56 (Long.) 110 51 04
Owner
Topography North slope South Creek Ridge

Altitude 7900 Openings
Formation (or kind of rock) Water from igneous overlying Tununk Shale
Improvements, use Stock
Discharge 8-1D* gpm cfs M, (E), R Temperature 7 °C 45 °F
Conductance 30D m mhos pH
Oate of record 7/30/1975 1976 Recorded by H. D. Goode
Remarks:
* 7/15/76 8°C 310 mmho 10+ gpm E
7/17/76 Downatream - X of road north of South Creek Ridge
Est < 1 qt/min about 1 mi below spring
7/4/77 8°C 305mmho 1-2gpm E

Reference Number Sw-13 | Spring Schedule Henry Mountains Region | Name Five Canyon A
Quadrangle Mt Pennell
Orainage Sweetwater
Coordinates (D32-9)31dbd
Sub-drainage Five Canyon
County Garfield
Ident. # (Lat.) 37 58 4D (Long.) 11D 57 16
Owner
Topography Alcoves in rim of Tarantula Mesa

Altitude 6320 Openings Three
Formation (or kind of rock) Mesaverde Formation
Improvements, use
Oischarge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 8/13/1975 1976 Recorded by H. D. Goode
Remarks:
Three alcovea cross canyon at different levels. Slight seep from each but no down stream flow. Location of center alcove given. Inaccessible.

Reference Number Sw-14 nv | Spring Schedule Henry Mountains Region | Name Five Canyon B
Quadrangle Mt Pennell
Orainage Sweetwater
Coordinates (D-32-9)31daa
Sub-drainage Five Canyon
County Garfield
Ident. # (Lat.) 37 58 42 (Long.) 11D 57 01
Owner
Topography Below rim of Tarantula Mesa

Altitude 622D Openings
Formation (or kind of rock) Mesaverde Formation
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by H. D. Goode 2/11/77
Remarks:
Did not visit - shown on BLM map

Reference Number Sw-15 | Spring Schedule Henry Mountains Region | Name Five North Spg
Quadrangle Mt Pennell
Drainage Sweetwater
Coordinates (D32-9)30bcc
Sub-drainage Five Canyon
County Garfield
Ident. # (Lat.) 37 59 42 (Long.) 11D 58 D2
Owner
Topography Alcove in rim of Tarantula Mesa

Altitude 6180 Openings
Formation (or kind of rock) Mesaverde Formation
Improvements, use
Discharge Seep gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Oate of record 8/13/1975 1976 Recorded by H. D. Goode
Remarks:
Large alcove 250 ft below mesa rim. Seep in sandstone over grey sandstone and shale.

Reference Number Sw-16 | Spring Schedule Henry Mountains Region | Name Five South Spg
Quadrangle Mt Pennell
Orainage Sweetwater
Coordinates (D32-9)30cbb
Sub-drainage Five Canyon
County Garfield
Ident. # (Lat.) 37 59 35 (Long.) 110 58 00
Owner
Topography Alcove in rim of Tarantula Mesa

Altitude 6180 Openings
Formation (or kind of rock) Mesaverde Formation
Improvements, use
Oischarge Seep gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Oate of record 8/13/1975 1976 Recorded by H. D. Goode
Remarks:
Large alcove 250 ft below mesa rim. Seep in sandstone over grey sandstone and shale.

Reference Number Sw-17 — Spring Schedule Henry Mountains Region — Name Dripping Rock Seep
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-8)24caa
Sub-drainage Sweetwater
County Garfield
Ident. # (Lat.) 38 05 43 (Long.) 110 58 41
Owner
Topography Sandstone ledge beside stream channel

Altitude 5480 Openings Seep
Formation (or kind of rock) Emery Sandstone over shale
Improvements, use Stock
Discharge 4 gpm cfs M, (E), R, Temperature 15 °C °F
Conductance 1500 m mhos pH
Date of record 8/22/1975 1976 Recorded by H. D. Goode
Remarks:
75 C 8/22/75

Reference Number Sw-18 — Spring Schedule Henry Mountains Region — Name Poison Wash Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-8)13bcc
Sub-drainage Poison Wash
County Garfield
Ident. # (Lat.) 38 06 38 (Long.) 110 59 08
Owner
Topography Canyon bottom

Altitude 5430 Openings
Formation (or kind of rock) Emery Sandstone (probably about 100 ft below upper ? coal)
Improvements, use
Discharge 1 gpm cfs M, (E), R Temperature 19 °C °F
Conductance 4400 m mhos pH
Date of record 1975 8/5/ 1976 Recorded by H. D. Goode
Remarks:
Alluvium may store some flood water but is so clayey most flood water runs off.
Vegetation: Wiregrass, salt cedar

Reference Number Sw-19 — Spring Schedule Henry Mountains Region — Name Head-of-Dugout
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)33abc
Sub-drainage Dugout Creek
County Garfield
Ident. # (Lat.) 38 04 14 (Long.) 110 48 40
Owner
Topography Deep gully cut by Dugout Creek

Altitude 9480 Openings
Formation (or kind of rock) Igneous colluvium on the Blue Gate Shale
Improvements, use
Discharge 3-4 gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 7/29/ 1975 1976 Recorded by
Remarks:

Reference Number Sw-20 — Spring Schedule Henry Mountains Region — Name Cabin Spring
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)28ccc
Sub-drainage Dugout Creek
County Garfield
Ident. # (Lat.) 38 04 28 (Long.) 110 49 17
Owner
Topography Slope above Dugout Creek

Altitude 8960 Openings
Formation (or kind of rock) Colluvium over Blue Gate Shale
Improvements, use
Discharge 12* gpm cfs (M), E, R Temperature 5 °C °F
Conductance 230 m mhos pH
Date of record 7/29/1975 1976 Recorded by H. D. Goode
Remarks:
* measured with weir
Spring comes out on an old mud flow consisting principally of igneous float.
Vegetation: Aspen, ponderosa

Reference Number Sw-21 — Spring Schedule Henry Mountains Region — Name Upper Dugout Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)29ddd
Sub-drainage Dugout
County Garfield
Ident. # (Lat.) 38 04 29 (Long.) 110 49 22
Owner
Topography North side of creek channel

Altitude 8860 Openings Many
Formation (or kind of rock) Colluvium
Improvements, use Flows into Dugout Creek
Discharge 50-100 gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/18/ 1976 Recorded by H. D. Goode
Remarks:
Road crossing, head of Dugout. Water goes directly into Dugout Creek.
7/4/77 6°C 350mmho 20gpm E
- no flow in adjacent Dugout Creek

Reference Number Sw-22 — Spring Schedule Henry Mountains Region — Name Burned Ridge Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)28aca
Sub-drainage Dugout Creek
County Garfield
Ident. # (Lat.) 38 05 05 (Long.) 110 48 33
Owner
Topography South slope Burned Ridge

Altitude 10,000 Openings Several
Formation (or kind of rock) Diorite at Blue Gate Shale contact
Improvements, use Stock
Discharge 14 gpm cfs (M), E, R Temperature 5 °C °F
Conductance 220 m mhos pH
Date of record 7/29/ 1975 1976 Recorded by H. D. Goode
Remarks:

Reference Number Sw-23 — Spring Schedule Henry Mountains Region — Name Corral Point Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)29bdb
Sub-drainage Dugout Creek
County Carfield
Ident. # (Lat.) 38 05 05 (Long.) 110 50 08
Owner
Topography Slope below road west slope Corral Point

Altitude 8320 Openings
Formation (or kind of rock) Colluvium over Tununk Shale
Improvements, use
Discharge 32 gpm cfs (M), E, R, Temperature 8 °C °F
Conductance 350 m mhos pH
Date of record 1975 7/17/ 1976 Recorded by H. D. Goode
Remarks:
C 7/29/76 7 1/2°C 350 mmho 31 gpm M
7/3/77 9°C 350mmho 15gpm M

Reference Number Sw-24 — Spring Schedule Henry Mountains Region — Name Dugout-Corral Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)29bcb
Sub-drainage Dugout
County Garfield
Ident. # (Lat.) 38 05 00 (Long.) 110 50 23
Owner
Topography Steep bank above Dugout Creek

Altitude 8070 Openings
Formation (or kind of rock) Ferron Sandstone or colluvium over Tununk Shale
Improvements, use
Discharge 6 gpm cfs (M), E, R Temperature 9 °C °F
Conductance 450 m mhos pH
Date of record 1975 7/29/1976 Recorded by H. D. Goode
Remarks:
Tufa below spring
Vegetation: Aspen, brush

Reference Number Sw-25 | Spring Schedule Henry Mountains Region | Name Beaver Dam Spg
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-10)30ada
Sub-drainage Dugout Creek | County Carfield
Ident. # (Lat.) 38 05 03 (Long.) 110 50 25 | Owner
Topography Slope west aide Corral Point

Altitude 8080 | Openings
Formation (or kind of rock) Ferron Sandstone or colluvium over sandstone
Improvements, use
Discharge 50 gpm cfs (M) E, R, Temperature 8 °C °F
Conductance 460 m mhos pH
Date of record 1975 7/29/1976 | Recorded by H. D. Coode
Remarks:
C 7/29/76
Tufa deposita. Beaver dam blocks flow.
Vegetation: Aspen

Reference Number Sw-26 | Spring Schedule Henry Mountains Region | Name Aapen Hole Spg
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-10)30aaa
Sub-drainage Dugout Creek | County Carfield
Ident. # (Lat.) 38 05 14 (Long.) 110 50 26 | Owner
Topography West slope Corral Point

Altitude 8080 | Openings
Formation (or kind of rock) Igneous colluvium over Tununk Shale
Improvements, use
Discharge 50* gpm cfs (M) E, R Temperature 7 °C °F
Conductance 340 m mhos pH
Date of record 1975 7/29/ 1976 | Recorded by H. D. Goode
Remarks:
* Meaaured at the change in slope 150 yds below orifice.
C 7/29/76
7/17/76 6 1/2°C 50+ gpm E
Water rises through colluvium in grove of aspen but can be heard upalope above orifice.

Reference Number Sw-27 | Spring Schedule Henry Mountains Region | Name Igneoua Slope Spg
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-10)30aab
Sub-drainage Dugout | County Carfield
Ident. # (Lat.) 38 05 13 (Long.) 110 50 33 | Owner
Topography Top of change in slope, alope steepens below

Altitude 7990 | Dpenings 1
Formation (or kind of rock) Colluvium over igneoua
Improvements, use
Oischarge 14 gpm cfs (M) E, R, Temperature 7 °C °F
Conductance 380 m mhos pH
Date of record 1975 7/29/ 1976 | Recorded by H. D. Goode
Remarks:
Vegetation: Abundant

Reference Number Sw-28 | Spring Schedule Henry Mountains Region | Name Aspen Spring
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-10)30dad
Sub-drainage Dugout Creek | County Carfield
Ident. # (Lat.) 38 04 45 (Long.) 110 50 29 | Owner
Topography North-facing alope above Dugout Creek

Altitude 8320 | Openings Many amall orifices
Formation (or kind of rock) Colluvium over Blue Cate Shale
Improvements, use Stock
Discharge 15-20 gpm cfs M, (E) R Temperature 8 °C 47 °F
Conductance 800 m mhos pH
Date of record 7/30/ 1975 1976 | Recorded by H. D. Goode
Remarks:
Water appears to be coming from Shale below ridge top
Vegetation: Large grove of aspen

Reference Number Sw-29 | Spring Schedule Henry Mountains Region | Name North(South)Pork
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-10)20bbd
Sub-drainage Dugout, Pistol | County Garfield
Ident. # (Lat.) 38 05 59 (Long.) 110 50 16 | Owner
Topography Colluvial slope Spring riaea below cluater of four aspen

Altitude 8620 | Dpenings
Formation (or kind of rock) Colluvium over Tununk shale
Improvements, use
Discharge 70 gpm cfs (M) E, R, Temperature 6 °C 42 °F
Conductance 340 m mhos pH
Date of record 7/30/ 1975 1976 | Recorded by H. D. Goode
Remarks:
C 7/30/75
7/17/76 8:45 A 7°C 305mmho 50gpm M
7/4/77 8:05 A 6.5°C 320mmho <1gpm E
preaent orifice ia about 50 ft below dry orifice at aapen
Improvementa: 7/4/77 Ditch bulldozed from road to gully 25 ft weat of spring; work apparently abandoned becauae of low flow.

Reference Number Sw-30 | Spring Schedule Henry Mountains Region | Name Dave Teeples Spg
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-9)22cdc
Sub-drainage Dugout Creek | County Garfield
Ident. # (Lat.) 38 05 21 (Long.) 110 54 29 | Owner
Topography Low Pediment Benches

Altitude 6280 | Openings Several
Formation (or kind of rock) Pediment gravel at Emery sandstone lower contact
Improvements, use Spring house; atock
Discharge 5-8* gpm cfs M, (E) R Temperature 11 °C 52 °F
Conductance 750 m mhos pH
Date of record 7/31/ 1975 1976 | Recorded by H. D. Coode
Remarks:
Perhaps 50 gpm could be developed

Reference Number Sw-31 | Spring Schedule Henry Mountains Region | Name Dead Cows Spring
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-9)17cba
Sub-drainage Dugout | County Carfield
Ident. # (Lat.) 38 06 36 (Long.) 110 56 52 | Owner
Topography Channel of tributary to Dugout Creek

Altitude 5740 | Dpenings
Formation (or kind of rock) Alluvium
Improvements, use
Oischarge 8-10 gpm cfs M, (E) R, Temperature 30 °C 86 °F
Conductance 1300 m mhos pH
Date of record 7/31/1975 1976 | Recorded by H. D. Goode
Remarks:
C 7/31/75

Reference Number Sw-32 | Spring Schedule Henry Mountains Region | Name Star Flat Spg
Quadrangle Mt Ellen
Drainage Sweetwater | Coordinates (D31-10)18daa
Sub-drainage Dry Wash (Arch Creek on Hunt's map) | County Carfield
Ident. # (Lat.) 38 06 32 (Long.) 110 50 27 | Owner
Topography Gully bottom, about 30 ft deep

Altitude 8960 | Openings
Formation (or kind of rock) Colluvium over Tununk Shale
Improvements, use
Discharge 2-3 gpm cfs M, (E) R Temperature 15 °C 58.5 °F
Conductance 440 m mhos pH
Date of record 7/30/1975 1976 | Recorded by H. D. Goode
Remarks:

Reference Number Sw-33 | Spring Schedule Henry Mountains Region | Name Mud Spring
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D-31-9)15bab
Sub-drainage Dry Wash
County Garfield
Ident. # (Lat.) 38 07 00 (Long.) 110 54 29
Owner
Topography South bank Dry Wash

Altitude 6080 Openings
Formation (or kind of rock) Pediment gravel over Blue Gate Shale
Improvements, use Tank; stock
Discharge 2* gpm cfs M, (E), R, Temperature 15.5 °C °F
Conductance 1275 m mhos pH
Date of record 1975 8/4/ 1976 Recorded by H. D. Goode
Remarks:
* Could yield 5-10 gpm.
Two seep areas (slightly mislocated on topo sheet) SE of main spring were dry.
Vegetation: Willows

Reference Number Sw-34 | Spring Schedule Henry Mountains Region | Name Upper Dry Wash
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-9)7aca
Sub-drainage Dry Wash
County Garfield
Ident. # (Lat.) 38 07 37 (Long.) 110 57 18
Owner
Topography Rises in stream channel

Altitude 5580 Openings
Formation (or kind of rock) Alluvium over Emery Sandstone
Improvements, use
Discharge 5* gpm cfs (M), E, R Temperature 19 °C °F
Conductance 2200 m mhos pH
Date of record 1975 8/4/ 1976 Recorded by H. D. Goode
Remarks:
Probably stream channel underflow forced up by Sandstone barrier in stream channel.
*Flow may be higher than normal because of rain from storms of 7/31/ and 8/1/76.

Reference Number Sw-35 | Spring Schedule Henry Mountains Region | Name Dry Wash Trib Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-9)7abc
Sub-drainage Dry Wash
County Garfield
Ident. # (Lat.) 38 07 44 (Long.) 110 57 24
Owner
Topography Side of channel in trib to Dry Wash

Altitude 5570 Openings
Formation (or kind of rock) Probably alluvium over Emery Sandstone or from Sandstone
Improvements, use
Discharge < 1 gpm cfs M, (E), R, Temperature 28 °C* °F
Conductance 2400 m mhos pH
Date of record 1975 8/4/ 1976 Recorded by H. D. Goode
Remarks:
*Temperature measured in pool

Reference Number Sw-36 | Spring Schedule Henry Mountains Region | Name Dry Wash Sandstone
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-9)7acb
Sub-drainage Dry Wash
County Garfield
Ident. # (Lat.) 38 07 43 (Long.) 110 57 32
Owner
Topography Sandstone outcrop north side of channel

Altitude 5550 Openings
Formation (or kind of rock) Emery Sandstone
Improvements, use
Discharge < 1/8 gpm cfs M, (E), R Temperature 27 °C* °F
Conductance 2000 m mhos pH
Date of record 1975 8/4/ 1976 Recorded by H. D. Goode
Remarks:
Water oozes from Sandstone, not on bedding plane.
*Temperature measured in pool.

Reference Number Sw-37 | Spring Schedule Henry Mountains Region | Name Indian Water Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D30-9)32bab
Sub-drainage Unnamed trib
County Wayne
Ident. # (Lat.) 38 09 55 (Long.) 110 57 55
Owner
Topography Alcove in Emery Sandstone

Altitude 5410 Openings
Formation (or kind of rock) Emery
Improvements, use
Discharge 2 gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 8/4/ 1976 Recorded by H. D. Goode
Remarks:
Not readily accessible; looked at from rim.

Reference Number Sw-38 nv | Spring Schedule Henry Mountains Region | Name Sweetwater Spring
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D29-9)32ccb*
Sub-drainage
County Wayne
Ident. # (Lat.) 38° 14' 23 (Long.) 110 57 37
Owner
Topography Main channel Sweetwater Creek

Altitude 4850 Openings
Formation (or kind of rock) Probably Blue Gate Shale
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by H. D. Goode 3/24/77
Remarks:
* Shown on BLM and Topo maps; Air photos show vegetation.
Did not visit; too remote.

Reference Number Sw-39 | Spring Schedule Henry Mountains Region | Name Cedar-A Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)18aad
Sub-drainage Cedar Creek
County Garfield
Ident. # (Lat.) 38 06 54 (Long.) 110 50 27
Owner
Topography Canyon wall, south of Cedar Creek

Altitude 8880 Openings
Formation (or kind of rock) Colluvium over Tununk Shale
Improvements, use
Discharge 5 gpm cfs M, (E), R, Temperature 9.5 °C °F
Conductance 560 m mhos pH
Date of record 1975 7/30/1976 Recorded by Eric Olson
Remarks:
Vegetation: Aspen

Reference Number Sw-40 | Spring Schedule Henry Mountains Region | Name Cedar-B Spg
Quadrangle Mt Ellen
Drainage Sweetwater
Coordinates (D31-10)18baa
Sub-drainage Cedar Creek
County Garfield
Ident. # (Lat.) 38 07 04 (Long.) 110 50 59
Owner
Topography South side channel Cedar Creek

Altitude 8300 Openings
Formation (or kind of rock) Dakota Sandstone
Improvements, use
Discharge 10 gpm cfs M, (E), R Temperature 7 °C °F
Conductance 355 m mhos pH
Date of record 1975 7/30/1976 Recorded by Eric Olson
Remarks:

Reference Number Sw-41 — Spring Schedule Henry Mountains Region

Name Cedar-C Spg
Quadrangle Mt Ellen
Coordinates (D31-10)7cdd
County Garfield
Owner
Drainage Sweetwater
Sub-drainage Cedar Creek
Ident. # (Lat.) 38 07 06 (Long.) 110 51 04
Topography Rises in valley of tributary from north

Altitude 8240 Openings
Formation (or kind of rock) Colluvium
Improvements, use
Discharge 2 gpm cfs M, (E), R, Temperature 11.5 °C °F
Conductance 490 m mhos pH
Date of record 1975 7/30/1976 Recorded by Eric Olson
Remarks:

Reference Number Sw-42 — Spring Schedule Henry Mountains Region

Name Cedar-D Spring
Quadrangle Mt Ellen
Coordinates (D31-10)7ccd
County Garfield
Owner
Drainage Sweetwater
Sub-drainage Cedar Creek
Ident. # (Lat.) 38 07 16 (Long.) 110 51 27
Topography North side of stream channel

Altitude 7900 Openings
Formation (or kind of rock) Alluvium
Improvements, use
Discharge 1 gpm cfs M, (E), R Temperature 8 °C °F
Conductance 430 m mhos pH
Date of record 1975 7/30/ 1976 Recorded by Eric Olson
Remarks:

Reference Number Sw-43 — Spring Schedule Henry Mountains Region

Name Maiden Water Spg
Quadrangle Mt Ellen
Coordinates (D31-9)3bbc*
County Garfield
Owner
Drainage Sweetwater
Sub-drainage Cedar Creek
Ident. # (Lat.) 38 08 52 (Long.) 110 54 44
Topography Gully bottom

Altitude 5910 Openings
Formation (or kind of rock) Blue Gate Shale
Improvements, use Pipe and 2 troughs, stock
Discharge < 1 gpm cfs M, (E), R, Temperature 15 °C 59 °F
Conductance 750 m mhos pH
Date of record 7/31/1975 1976 Recorded by H. D. Goode
Remarks:
* Sec 3 includes about 900 acres

Reference Number Sw-44 nv — Spring Schedule Henry Mountains Region

Name
Quadrangle Mt Ellen
Coordinates (D30-9)35aba
County Wayne
Owner
Drainage Sweetwater
Sub-drainage Cedar Creek
Ident. # (Lat.) 38 09 55 (Long.) 110 54 18
Topography

Altitude 5520 Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/24/77 Recorded by H. D. Goode
Remarks:
Shows on BLM and topo maps. No visible vegetation on air photos. Did not visit; too remote.

Reference Number Sw-45 nv — Spring Schedule Henry Mountains Region

Name
Quadrangle Mt Ellen
Coordinates (D30-9)26aba
County Wayne
Owner
Drainage Sweetwater
Sub-drainage Cedar Creek
Ident. # (Lat.) 38 10 52 (Long.) 110 54 19
Topography

Altitude 5330 Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/24/77 Recorded by H. D. Goode
Remarks:
Shows on BLM and topo maps. No visible vegetation on air photos. Did not visit; too remote.

Reference Number Sw-46 nv — Spring Schedule Henry Mountains Region

Name
Quadrangle Mt Ellen
Coordinates (D30-9)13bcd
County Wayne
Owner
Drainage Sweetwater
Sub-drainage Cedar Creek
Ident. # (Lat.) 38 12 15 (Long.) 110 53 43
Topography

Altitude 5080 Openings
Formation (or kind of rock) Probably Alluvium
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/24/77 Recorded by H. D. Goode
Remarks:
Shows on BLM and topo maps. Sparse vegetation on air photos. Did not visit; too remote.

Reference Number Sw-47 nv — Spring Schedule Henry Mountains Region

Name Oak Creek Bench
Quadrangle Mt Ellen
Coordinates (D30-10)32bbc
County Wayne
Owner
Drainage Sweetwater
Sub-drainage Oak Creek, unnamed trib
Ident. # (Lat.) 38 09 50 (Long.) 110 51 36
Topography Bench

Altitude Openings
Formation (or kind of rock) Mudflow over Tununk shale
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/24/77 Recorded by H. D. Goode
Remarks:
Shows on BLM map and Hunts Geologic Map of the Henry Mtns but not on topo. Vegetation shows on air photos at approximate location. Did not visit; difficult access.

Reference Number Sw-48 nv — Spring Schedule Henry Mountains Region

Name Cottonwood Spring
Quadrangle Mt Ellen
Coordinates (D31-10)5adb*
County Garfield
Owner
Drainage Sweetwater
Sub-drainage Oak Creek**
Ident. # (Lat.) 38 08 54 (Long.) 110 49 34
Topography Canyon

Altitude 8170 Openings
Formation (or kind of rock) Probably rises from gravel over Blue Gate Shale
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/4/77 Recorded by H. D. Goode
Remarks:
* Section 5 includes about 900 acres.
** Mislabeled Cottonwood on USGS & BLM maps. Not visited - record from topo map

Reference Number Sw-49 | Spring Schedule Henry Mountains Region | Name Oak South Spring

Drainage Sweetwater | Quadrangle Mt Ellen

Sub-drainage Oak Crk | Coordinates (D30-10)33cdb

Ident. # (Lat.) 38 09 17 (Long.) 110 50 19 | County Wayne

Topography Valley bottom between Table Mtn and Mt Ellen | Owner

Altitude 7320 | Openings Many

Formation (or kind of rock) Probably Ferron Sandstone over Tununk Shale

Improvements, use Feeds stream

Discharge 150-200 gpm cfs M, (E), R, Temperature 8 °C 46 °F

Conductance 320 m mhos pH

Date of record 7/26/ 1975 1976 Recorded by H. D. Goode

Remarks:

C 7/26/75 Aggregate flow of this tributary, plus Oak Creek (including Oak North Spring) estimated at 300-400 gpm.

Vegetation: Abundant

Reference Number Sw-50 | Spring Schedule Henry Mountains Region | Name Oak North Spring

Drainage Sweetwater | Quadrangle Mt Ellen

Sub-drainage Oak Creek | Coordinates (D30-10)33cca

Ident. # (Lat.) 38 09 19 (Long.) 110 50 24 | County Wayne

Topography Stream channel between Table Mtn and Mt Ellen | Owner

Altitude 7280 | Openings

Formation (or kind of rock) Colluvium over Tununk shale

Improvements, use

Discharge 100 gpm cfs M, (E), R Temperature 7 °C 43 °F

Conductance 360 m mhos pH

Date of record 7/26/ 1975 1976 Recorded by H. D. Goode

Remarks:

Water in stream comes from higher up. Temp of stream 14°C

100 yds upstream from spring.

Reference Number Sw-51 | Spring Schedule Henry Mountains Region | Name Spring on Flat

Drainage Sweetwater | Quadrangle Mt Ellen

Sub-drainage Oak | Coordinates (D30-10)32dac

Ident. # (Lat.) 38 09 26 (Long.) 110 50 48 | County Wayne

Topography Swale on gentle slope | Owner

Altitude 7000 | Openings 1

Formation (or kind of rock) Colluvium over Tununk Shale

Improvements, use

Discharge 4-5 gpm cfs M, (E), R, Temperature 18 °C 65 °F

Conductance 850 m mhos pH

Date of record 7/26/ 1975 1976 Recorded by H. D. Goode

Remarks:

Reference Number Sw-52 nv | Spring Schedule Henry Mountains Region | Name Oak Creek Spring

Drainage Sweetwater | Quadrangle Mt Ellen

Sub-drainage Oak Creek | Coordinates (D30-10)29abc

Ident. # (Lat.) 38 10 38 (Long.) 110 51 05 | County Wayne

Topography Stream channel in deep gully | Owner

Altitude | Openings

Formation (or kind of rock) not known

Improvements, use

Discharge gpm cfs M, E, R Temperature °C °F

Conductance m mhos pH

Date of record 1975 1976 3/24/77 Recorded by H. D. Goode

Remarks:

Shows on BLM and topo maps. Vegetation shows on air photos.

Did not visit; difficult access.

Reference Number TW-1 | Spring Schedule Henry Mountains Region | Name Willow Spring
Quadrangle Mt Ellen
Drainage Town Wash | Coordinates (D30-10)29dba
Sub-drainage Cottonwood | County Wayne
Ident. # (Lat.) 38 10 25 (Long.) 110 50 58 | Owner
Topography Small topo basin below talus from Table Mountain

Altitude 6300 | Openings
Formation (or kind of rock) Colluvium over Tununk
Improvements, use Stock
Discharge 2 * gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 7/26/1975 1976 | Recorded by H. D. Goode
Remarks:
* Tufa above meadow suggests greater discharge in past.
Topo and BLM maps show incorrect location about 1/3 mile south of proper location.
Vegetation: Heavy grasses in 10-acre meadow

Reference Number TW-2 | Spring Schedule Henry Mountains Region | Name Lost Spring
Quadrangle Mt Ellen
Drainage Town Wash | Coordinates (D30-10)20ddb
Sub-drainage Cottonwood Creek | County Wayne
Ident. # (Lat.) 38 11 04 (Long.) 110 50 48 | Owner
Topography Gentle slope northwest of Table Mtn

Altitude 6020 | Openings
Formation (or kind of rock) Colluvium
Improvements, use
Discharge Dry gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 7/25/ 1975 1976 | Recorded by H. D. Goode
Remarks:
Meadow grasses, no water.
7/3/77. Since 1975 this spring has been developed and a pipe put in.
0.8 gpm M 11°C 610 mmho (pipe)
Overflow yields another 1 gpm E

Reference Number TW-3 | Spring Schedule Henry Mountains Region | Name Lower Lost Spg
Quadrangle Mt Ellen
Drainage Town Wash | Coordinates (D30-10)20aca
Sub-drainage Cottonwood Creek | County Wayne
Ident. # (Lat.) 38 11 30 (Long.) 110 50 54 | Owner
Topography Northwest slope Table Mtn

Altitude 5780 | Openings
Formation (or kind of rock) Colluvium over Ferron
Improvements, use Collection box, pipeline to tank
Discharge 9 gpm cfs (M), E, R, Temperature 12 °C 54 °F
Conductance 830 m mhos pH
Date of record 7/27/1975 1976 | Recorded by H. D. Goode
Remarks:
7/3/77. 5 1/2 gpm 12°C 780 mmho M

Reference Number TW-4 | Spring Schedule Henry Mountains Region | Name Jet Basin Spg
Quadrangle Mt Ellen
Drainage Town Wash | Coordinates (D30-10)23cbb
Sub-drainage Coaly Wash | County Wayne
Ident. # (Lat.) 38 11 13 (Long.) 110 48 19 | Owner
Topography Water rises from Mancos - probably from Sandstone bed - down dip 10° in east side of deeply eroded Jet Basin.
Altitude 6040 | Openings Probably several
Formation (or kind of rock) Probably a sandstone bed in Tununk Shale
Improvements, use Probably used by stock
Discharge 14 gpm cfs (M), E, R Temperature 13.5 °C °F
Conductance 680 * Beck m mhos 8.2 pH
Date of record 1975 8/28/ 1976 | Recorded by H. D. Goode
Remarks:
C 8/28/76
* Hach meter measured 650
Vegetation: Birch, pine, tall grass

Reference Number TW-5 | Spring Schedule Henry Mountains Region | Name Giles Seep
Quadrangle Factory Butte
Drainage Town Wash | Coordinates (D29-10)20bbc
Sub-drainage Cottonwood Crk | County Wayne
Ident. # (Lat.) 38 16 39 (Long.) 110 51 38 | Owner
Topography Stripped surfaces on sandstone

Altitude 4720 | Openings Seep
Formation (or kind of rock) Water from Ferron Sandstone over Tununk shale
Improvements, use
Discharge 0 gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 7/25/1975 1976 | Recorded by H. D. Goode
Remarks:
Vegetation: Cottonwood

Reference Number TW-6 | Spring Schedule Henry Mountains Region | Name Town Seep
Quadrangle Factory Butte
Drainage Town Wash | Coordinates (D29-10)17acd
Sub-drainage Unnamed trib | County Wayne
Ident. # (Lat.) 38 17 21 (Long.) 110 50 54 | Owner
Topography South side of sandy wash

Altitude 4730 | Openings
Formation (or kind of rock) Alluvium
Improvements, use
Oischarge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/31/ 1976 | Recorded by H. D. Goode
Remarks:
No water
Vegetation: Cottonwoods

Reference Number BC-1 nv
Spring Schedule Henry Mountains Region
Name Upper Dry Lakes
Quadrangle Mt Ellen
Coordinates (D31-10)4dad
County Garfield
Owner
Drainage Birch Creek
Sub-drainage
Ident. # (Lat.) 38 08 12 (Long.) 110 48 18
Topography Canyon

Altitude 9100 Openings
Formation (or kind of rock) Probably colluvium over Blue Gate Shale
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/4/77 Recorded by
Remarks:
Did not visit. Record from topo map.

Reference Number BC-5
Spring Schedule Henry Mountains Region
Name Dugout Break Spg
Quadrangle Mt Ellen
Coordinates (D30-10)12add
County Wayne
Owner
Drainage Birch Creek
Sub-drainage Unnamed trib
Ident. # (Lat.) 38 13 08 (Long.) 110 46 23
Topography Break in slope at edge of pediment

Altitude 5280 Openings
Formation (or kind of rock) Pediment gravel on Tununk Shale
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 8/2/ 1976 Recorded by H. D. Goode
Remarks:
No water
Vegetation: Wire grasa, Indian Paintbrush

Reference Number BC-2 nv
Spring Schedule Henry Mountains Region
Name Lower Dry Lakes
Quadrangle Mt Ellen
Coordinates (D31-10)3dbb*
County Garfield
Owner
Drainage Birch Creek
Sub-drainage
Ident. # (Lat.) 38 08 30 (Long.) 110 48 04
Topography Canyon

Altitude 8650 Openings
Formation (or kind of rock) Probably colluvium over Blue Gate Shale
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/4/77 Recorded by H. D. Goode
Remarks:
* Sec 3 includea about 900 acres.
Did not visit. Record from topo map.

Reference Number BC-6
Spring Schedule Henry Mountains Region
Name Bert Avery Spg
Quadrangle Factory Butte
Conrdinates (D29-10)22ccc*
County Wayne
Owner
Drainage Birch Creek
Sub-drainage Unnamed
Ident. # (Lat.) 38 16 03 (Long.) 110 49 19
Topography Below stripped sandstone bed

Altitude 4860 Openings Two alcoves
Formation (or kind of rock) Ferron sandstone over shale bed
Improvements, use Tank, stock
Discharge 1 gpm cfs M, (E), R Temperature 23 °C °F
Conductance 610 m mhos pH
Date of record 7/25/1975 1976 Recorded by H. D. Goode
Remarks:
* Location of Southern Spring
6/15/77 20°C 535 mmho about 1 gpm
7/2/77 21°C 605mmho pH7.5 1gpm M

Reference Number BC-3 nv
Spring Schedule Henry Mountains Region
Name Cold Spring
Quadrangle Mt Ellen
Coordinates (D-30-10)35cdd
County Wayne
Owner
Drainage Birch Creek
Sub-drainage Birch Creek
Ident. # (Lat.) 38 09 12 (Long.) 110 48 04
Topography Canyon

Altitude 7760 Openings
Formation (or kind of rock) Colluvium over Blue Gate Shale
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/4/77 Recorded by
Remarks:
Didn't viait - record from topo map.
Not evident on aerial photoa.

Reference Number BC-4
Spring Schedule Henry Mountains Region
Name Dugout Bench
Quadrangle Mt Ellen
Coordinates (D30-10)13bcb
County Wayne
Owner
Drainage Birch Creek
Sub-drainage Unnamed
Ident. # (Lat.) 38 12 20 (Long.) 110 47 11
Topography Seepa from near bottom of gully in pediment

Altitude 5560 Openings
Formation (or kind of rock) Pediment gravel probably over Tununk Shale
Improvements, use
Discharge < 1 gpm cfs M, (E), R Temperature 18 °C 65 °F
Conductance 630 m mhos pH
Date of record 7/27/ 1975 1976 Recorded by H. D. Goode
Remarks:
Vegetation: Big cottonwood

Reference Number SaW-1
Spring Schedule Henry Mountains Region
Name Sand Seeps
Quadrangle Factory Butte
Coordinates (D29-10)1aad
County Wayne
Owner
Drainage Sand Waah*
Sub-drainage
Ident. # (Lat.) 38 19 14 (Long.) 110 46 08
Topography In or near creek bed

Altitude 4500 Openings
Formation (or kind of rock) Alluvium probably over aandstone in Morriaon
Improvements, use
Discharge 0 gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 7/25/ 1975 1976 Recorded by H. D. Goode
Remarks:
No flow, tiny pond left from last flood or held up by seepage area.
* Shown as Salt Creek on Hunt's map (Prof. P. 228)

Reference Number Bu-1 | Spring Schedule Henry Mountains Region | Name Bull Creek Pass
Quadrangle Mt Ellen
Drainage Bull Creek | Coordinates (D31-10) 27bdc
Sub-drainage Bull Creek | County Garfield
Ident. # (Lat.) 38 04 58 (Long.) 110 47 54 | Owner
Topography Steep gully east slope Mt Ellen

Altitude 10,480 | Openings In broken diorite
Formation (or kind of rock) Diorite below fracture zones
Improvements, use
Oischarge 8-10 gpm cfs M, (E), R, | Temperature 3 °C °F
Conductance 220 m mhos pH
Oate of record 7/29/1975 1976 | Recorded by H. D. Goode
Remarks:
Vegetation: Alpine

Reference Number Bu-2 | Spring Schedule Henry Mountains Region | Name Lonesome Beaver
Quadrangle Mt Ellen
Orainage Bull Creek | Coordinates (D31-10) 14bdd
Sub-drainage Bull Creek | County Garfield
Ident. # (Lat.) 38 06 43 (Long.) 110 46 29 | Owner
Topography Mountain Valley

Altitude 8090 | Openings
Formation (or kind of rock)
Improvements, use Campground
Oischarge gpm cfs M, E, R | Temperature 9 °C °F
Conductance 410 m mhos pH
Oate of record 7/29/1975 1976 | Recorded by H. D. Goode
Remarks:
C 7/29/75
Water from campground faucet.
Vegetation: Pine Forest
C 8/22/75

Reference Number Bu-3 nv | Spring Schedule Henry Mountains Region | Name Ellen Spring
Quadrangle Mt Ellen
Orainage Bull Creek | Coordinates (D31-10) 9ddd
Sub-drainage Mt Ellen Creek | County Garfield
Ident. # (Lat.) 38 07 05 (Long.) 110 48 18 | Owner
Topography East slope Mt Ellen

Altitude 9900 | Openings
Formation (or kind of rock) Boulder colluvium over bedrock (igneous?)
Improvements, use
Oischarge several gpm cfs M, E, (R), | Temperature °C °F
Conductance m mhos pH
Oate of record 1975 1976 | Recorded by C. B. Hunt, Prof. Paper 228, p 213
Remarks:
Did not visit. Record from Hunt, Prof. Paper 228.

Reference Number Bu-4 | Spring Schedule Henry Mountains Region | Name Little Meadow
Quadrangle Mt Ellen
Orainage Bull Creek | Coordinates (D30-11) 19ddb
Sub-drainage Unnamed trib | County Wayne
Ident. # (Lat.) 38 11 03 (Long.) 110 45 11 | Owner
Topography Grassy meadow

Altitude 5680 | Openings Several
Formation (or kind of rock) Swale in Tununk shale
Improvements, use
Discharge 2 gpm cfs M, (E), R | Temperature 16 °C 61 °F
Conductance 595 m mhos pH
Date of record 7/11/1975 1976 | Recorded by H. D. Goode
Remarks:
Yields 2 gpm E downstream
Vegetation: Spring supports about 1 acre of grass

Reference Number Bu-5 | Spring Schedule Henry Mountains Region | Name Birch Spring
Quadrangle Mt Ellen
Orainage Bull Creek | Coordinates (D30-10) 25bcb
Sub-drainage McClellan Wash | County Wayne
Ident. # (Lat.) 38 10 36 (Long.) 110 47 17 | Owner
Topography Near top of ridge on west-facing slope

Altitude 6320 | Openings Seepage
Formation (or kind of rock) Probably pediment gravel over igneous or shale
Improvements, use stock
Oischarge 13 gpm cfs (M), E, R, | Temperature 15 °C °F
Conductance 620 Beck m mhos 8.2 pH
Oate of record 1975 8/27/ 1976 | Recorded by H. D. Goode
Remarks:
Water reaches main channel and disappears.
C 8/27/76
Measured and sampled below birches, near bend in fence line.
7/2/77 27°C 680mmho 8gpm M

Reference Number Bu-6 | Spring Schedule Henry Mountains Region | Name McClellan Wash
Quadrangle Mt Ellen
Drainage Bull Creek | Coordinates (D30-10) 25bba
Sub-drainage McClellan Wash | County Wayne
Ident. # (Lat.) 38 10 50 (Long.) 110 47 04 | Owner
Topography Bottom of stream channel - water issues from pediment gravel

Altitude 6140 | Openings Several
Formation (or kind of rock) Pediment gravel
Improvements, use Stock
Discharge 23 * gpm cfs (M), E, R | Temperature 12 °C °F
Conductance 770 ** Beck m mhos 8.2 pH
Oate of record 1975 8/27/ 1976 | Recorded by H. D. Goode
Remarks:
* Measured flow and sampled about 100 ft below main orifice (temp 17°)
** Hach meter measured 750.
C 8/27/76
7/2/77 20°C 680mmho 20gpm M

Reference Number Bu-7 | Spring Schedule Henry Mountains Region | Name McClellan Wash Seep
Quadrangle Mt Ellen
Orainage Bull Creek | Coordinates (D30-10) 24cdc
Sub-drainage McClellan Wash | County Wayne
Ident. # (Lat.) 38 10 52 (Long.) 110 47 03 | Owner
Topography South slope of channel

Altitude 6120 | Openings Seep
Formation (or kind of rock) Pediment gravel over shale
Improvements, use
Oischarge < 1/4 gpm cfs M, (E), R, | Temperature 12.5 °C °F
Conductance 800 m mhos pH
Date of record 1975 8/27/ 1976 | Recorded by H. D. Goode
Remarks:
Tufa deposits

Reference Number Bu-8 | Spring Schedule Henry Mountains Region | Name Bench Seep-A
Quadrangle Mt Ellen
Orainage Bull Creek | Coordinates (D30-10) 13dab
Sub-drainage McClellan Wash | County Wayne
Ident. # (Lat.) 38 12 05 (Long.) 110 46 18 | Owner
Topography Small gully cut into pediment surface

Altitude 5560 | Openings Seepage
Formation (or kind of rock) Pediment gravel *
Improvements, use
Oischarge < 1 gpm cfs M, (E), R | Temperature 12 °C °F
Conductance 1050 m mhos pH
Date of record 1975 8/28/ 1976 | Recorded by H. D. Goode
Remarks:
* E-W lineation of vegetation (gully runs S to N) suggests that water may be rising along a fault.

Reference Number Bu-9 | Spring Schedule Henry Mountains Region | Name Bench Seep-B | Quadrangle Mt Ellen | Coordinates (D30-10)13acd | County Wayne | Owner

Drainage Bull Creek
Sub-drainage Unnamed
Ident. # (Lat.) 38 12 15 (Long.) 110 46 25
Topography Side of gully about 20 ft below pediment surface

Altitude 5520 Openings 1
Formation (or kind of rock) Pediment gravel over Tununk shale
Improvements, use Stock
Discharge 1 gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 8/27/ 1976 Recorded by H. D. Goode
Remarks:
Inaccessible; saw from rim.

Reference Number Bu-10 | Spring Schedule Henry Mountains Region | Name Side Hill Springs | Quadrangle Mt Ellen | Coordinates (D30-10)12ddb | County Wayne | Owner

Drainage Bull Creek
Sub-drainage Unnamed
Ident. # (Lat.) 38 12 47 (Long.) 110 46 18
Topography Springs along fully cut into pediment gravel, springs issue 30 to 40 ft below pediment surface

Altitude 5310 Openings 4
Formation (or kind of rock) Pediment gravel on Tununk shale
Improvements, use
Discharge 10 gpm cfs M, (E), R Temperature 18 °C °F
Conductance 690 m mhos pH
Date of record 7/11/ 1975 1976 Recorded by H. D. Goode
Remarks:
Location of Northern Seep
Vegetation: Willows

Reference Number Bu-11 | Spring Schedule Henry Mountains Region | Name White Point Seeps | Quadrangle Hanksville | Coordinates (D29-11)19ddd | County Wayne | Owner

Drainage Bull Crk
Sub-drainage Bull Crk
Ident. # (Lat.) 38 15 55 (Long.) 110 44 59
Topography From alluvium into channel of Bull Crk

Altitude 4770 Openings
Formation (or kind of rock) Alluvium
Improvements, use Stock
Discharge 0 gpm cfs M, E, R, Temperature 23 °C 74 °F
Conductance 2200 m mhos pH
Date of record 7/27/ 1975 1976 Recorded by H. D. Goode
Remarks:
Small puddle, no flow.
Vegetation: Profuse salt cedar

Reference Number Bu-12 | Spring Schedule Henry Mountains Region | Name Morrison Seep | Quadrangle Hanksville | Coordinates (D29-11)18add | County Wayne | Owner

Drainage Bull Creek
Sub-drainage Bull Creek
Ident. # (Lat.) 38 17 15 (Long.) 110 44 59
Topography Pond beside stream channel

Altitude 4650 Openings
Formation (or kind of rock) Morrison (Sandstone)
Improvements, use
Discharge 1 gpm cfs M, (E), R Temperature 22 °C °F
Conductance 1650 m mhos pH
Date of record 1975 8/1/ 1976 Recorded by H. D. Goode
Remarks:
Pond apparently supported by seepage.

Reference Number DV-1 | Spring Schedule Henry Mountains Region | Name Cow Wash Spring | Quadrangle Bull Mtn | Coordinates (D30-11)5dbc | County Wayne | Owner Robinson

Drainage Dry Valley Wash
Sub-drainage Cow Wash
Ident. # (Lat.) 38 13 32 (Long.) 110 44 18
Topography Swale in pediment surface

Altitude 5080 Openings Several
Formation (or kind of rock) Pediment gravel over Morrison
Improvements, use Stock, feeds creek
Discharge * gpm cfs M, E, R, Temperature 21 °C ** 70 °F
Conductance 710 m mhos pH
Date of record 1975 8/3/ 1976 Recorded by H. D. Goode
Remarks:
* Spring area fed by return flow from irrigation.
** At orifice; at a measuring point below two ponds about 1500 ft below orifices:
23°C 680 mmho 100 gpm M
Mr. Robinson reports no flow in 1975.
C 8/3/76

Reference Number DV-2 | Spring Schedule Henry Mountains Region | Name Penitentiary Seep | Quadrangle Hanksville | Coordinates (D29-12)30ccc | County Wayne | Owner

Drainage Dry Valley Wash
Sub-drainage Halfway Wash
Ident. # (Lat.) 38 15 04 (Long.) 110 39 22
Topography Coming from bank of stream channel

Altitude 4750 Openings
Formation (or kind of rock) Alluvium over Entrada
Improvements, use
Discharge 0 gpm cfs M, E, R Temperature 18 °C 65 °F
Conductance > 8000 (off scale) m mhos pH
Date of record 7/28/ 1975 1976 Recorded by H. D. Goode
Remarks:
Stagnant salty water on black muck

Reference Number BG-1 nv | Spring Schedule Henry Mountains Region | Name Granite Ridge Spg
Quadrangle Mt Ellen
Drainage Beaver Canyon | Coordinates (D31-10)26acb
Sub-drainage Granite Wash, Granite Creek | County Garfield
Ident. # (Lat.) 38 04 59 (Long.) 110 46 33 | Owner
Topography Swale east slope Granite Ridge

Altitude 9320 | Openings
Formation (or kind of rock) Igneous
Improvements, use
Discharge gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos pH
Date of record 7/29/ 1975 1976 | Recorded by H. D. Goode
Remarks:
No flow at road, did not climb to spring.

Reference Number BG-5 nv | Spring Schedule Henry Mountains Region | Name Goatwater Spring
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D30-11)36dbb
Sub-drainage Granite Wash, Goatwater Creek | County Wayne
Ident. # (Lat.) 38 09 28 (Long.) 110 39 54 | Owner
Topography Bottom of canyon

Altitude 5150 | Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/21/77 | Recorded by H. D. Goode
Remarks:
Did not visit

Reference Number BG-2 | Spring Schedule Henry Mountains Region | Name Dakota A
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D31-11)28aaa
Sub-drainage Granite Wash, Unnamed trib | County Wayne
Ident. # (Lat.) 38 10 47 (Long.) 110 42 52 | Owner
Topography Below pediment rim

Altitude 5540 | Openings
Formation (or kind of rock) In or above Coal in Dakota
Improvements, use
Discharge * gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 8/11/ 1976 | Recorded by H. D. Goode
Remarks:
* No water
Vegetation: large cottonwood

Reference Number BG-6 | Spring Schedule Henry Mountains Region | Name Granite Wash Spg
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D30-12)4caa*
Sub-drainage Granite Wash | County Wayne
Ident. # (Lat.) 38 13 48 (Long.) 110 36 46 | Owner
Topography Dunes on both side of channel

Altitude 4635 | Openings Seeps
Formation (or kind of rock) Sand dunes (may be forced up by Morrison Fm)
Improvements, use Stock
Discharge * gpm cfs M, E, R | Temperature 17 °C 63 °F
Conductance 2300 m mhos pH
Date of record 7/28/1975 1976 | Recorded by H. D. Goode
Remarks:
* Sec 4 has only about 550 acres
Abundant salt cedar, perhaps could yield 5-10 gpm.

Reference Number BG-3 | Spring Schedule Henry Mountains Region | Name
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D31-11)27bdb
Sub-drainage Granite Wash, unnamed trib | County Wayne
Ident. # (Lat.) 38 10 38 (Long.) 110 42 29 | Owner
Topography Landslide surface, north-trending gully

Altitude 5430 | Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos pH
Date of record 1975 8/1/ 1976 | Recorded by H. D. Goode
Remarks:
Saw only from a distance. Tall grass, no visible water.

Reference Number BG-7 | Spring Schedule Henry Mountains Region | Name Pool Spring
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D29-12)33cdb
Sub-drainage Granite Wash, unnamed trib | County Wayne
Ident. # (Lat.) 38 14 23 (Long.) 110 36 46 | Owner
Topography

Altitude 4600 | Openings
Formation (or kind of rock) Alluvium
Improvements, use
Discharge * gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos pH
Date of record 7/28/ 1975 1976 | Recorded by H. D. Goode
Remarks:
* No visible flow

Reference Number BG-4 | Spring Schedule Henry Mountains Region | Name Granite-A Spring
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D30-11)27abc
Sub-drainage Granite Wash, unnamed trib | County Wayne
Ident. # (Lat.) 38 10 43 (Long.) 110 42 06 | Owner
Topography About 30 ft below pediment rim

Altitude 5410 | Openings
Formation (or kind of rock) Pediment gravel over Morrison
Improvements, use Tank, dry
Discharge * gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 8/1/ 1976 | Recorded by H. D. Goode
Remarks:
* No Water
Vegetation: Dying salt cedar

Reference Number BG-8 nv | Spring Schedule Henry Mountains Region | Name Beaver Canyon Spg
Quadrangle Bull Mtn
Drainage Beaver Canyon | Coordinates (D29-12)35aaa
Sub-drainage | County Wayne
Ident. # (Lat.) 38 14 56 (Long.) 110 33 53 | Owner
Topography Canyon bottom

Altitude 4390 | Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/21/77 | Recorded by H. D. Goode
Remarks:
Did not visit.

Reference Number BG-9 * nv | Spring Schedule Henry Mountains Region | Name Angel Cove
Quadrangle Hanksville
Drainage Dirty Devil | Coordinates (D29-13)7abc
Sub-drainage | County Wayne
Ident. # (Lat.) 38 18 28 (Long.) 110 32 09 | Owner
Topography Steep cliff west side Dirty Devil River

Altitude 4100 Openings
Formation (or kind of rock) Probably from base of Navajo Sandstone
Improvements, use
Discharge 1 gpm cfs M, E, (R) Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by
Remarks:
* This spring is not in Beaver-Granite drainage but is only about 1/2 mi north of confluence of Beaver with Dirty Devil.

Reference Number PB-3 | Spring Schedule Henry Mountains Region | Name Butler-A
Quadrangle Bull Mtn
Drainage Poison Spring Canyon | Coordinates (D31-11)30dbc
Sub-drainage Butler Creek, South Fork Butler | County Garfield
Ident. # (Lat.) 38 04 40 (Long.) 110 44 20 | Owner
Topography Creek bottom

Altitude 7400 Openings
Formation (or kind of rock) Alluvium over black shale *
Improvements, use
Discharge < 1/4 gpm cfs M, (E), R, Temperature 13 °C °F
Conductance 2100 m mhos pH
Date of record 9/11/1975 1976 Recorded by H. D. Goode
Remarks:
* Hunt's map shows Morrison at this locality. Shale may be part of a landslide deposit.

Reference Number PB-4 | Spring Schedule Henry Mountains Region | Name Butler-B
Quadrangle Bull Mtn
Drainage Poison Spring Canyon | Coordinates (D31-12)3ccd
Sub-drainage Butler Wash | County Garfield
Ident. # (Lat.) 38 08 03 (Long.) 110 34 52 | Owner
Topography Bottom of wash

Altitude 4780 Openings
Formation (or kind of rock) Alluvium
Improvements, use Stock
Discharge * gpm cfs M, E, R Temperature 22 °C 71 °F
Conductance 1500 m mhos pH
Date of record 8/1/1975 1976 Recorded by H. D. Goode
Remarks:
Developed by bulldozing into stream channel to form pond. No visible flow.

Reference Number PB-1 | Spring Schedule Henry Mountains Region | Name Poison Spring
Quadrangle Bull Mtn
Drainage Poison Spring Canyon | Coordinates (D31-11)1cab *
Sub-drainage | County Garfield
Ident. # (Lat.) 38 08 27 (Long.) 110 39 10 | Owner
Topography Sandstone shelf beside stream channel

Altitude 5230 Openings Several in Sandstone shelves
Formation (or kind of rock) From Sandstone in Morrison Fm
Improvements, use
Discharge 2-3 gpm cfs M, (E), R, Temperature 16 °C 60 °F
Conductance 1000 m mhos pH
Date of record 8/1/1975 1976 Recorded by H. D. Goode
Remarks:
C 8/1/75
* Sec 1 has about 900 acres.

Reference Number PB-5 | Spring Schedule Henry Mountains Region | Name Dell Seeps
Quadrangle Bull Mtn
Drainage Poison Spring Canyon | Coordinates (D30-13)30cad *
Sub-drainage Unnamed trib | County Wayne
Ident. # (Lat.) 38 10 14 (Long.) 110 32 17 | Owner
Topography Ledge of Entrada

Altitude 5140 Openings Seeps
Formation (or kind of rock) From X-bedded Sandstone at base of Entrada above Carmel.
Improvements, use 2 tanks, trough - stock
Discharge < 1 gpm cfs M, (E), R, Temperature 27 °C 80 °F
Conductance 255 m mhos pH
Date of record 7/28/1975 1976 Recorded by H. D. Goode
Remarks:
C 7/28/75
* Spring misplaced on topo map.

Reference Number PB-2 | Spring Schedule Henry Mountains Region | Name Poison Trib Spg
Quadrangle Bull Mtn
Drainage Poison Spring Canyon | Coordinates (D31-11)1ccd
Sub-drainage Unnamed trib | County Garfield
Ident. # (Lat.) 38 08 01 (Long.) 110 39 18 | Owner
Topography Sandstone bench cut by stream

Altitude 5205 Openings
Formation (or kind of rock) Sandstone in Morrison Fm
Improvements, use
Discharge 1-2 gpm cfs M, (E), R Temperature 19 °C 66 °F
Conductance 1500 m mhos pH
Date of record 8/1/1975 1976 Recorded by H. D. Goode
Remarks:
Vegetation: Wiregrass

Reference Number PB-6 nv | Spring Schedule Henry Mountains Region | Name
Quadrangle Fiddler Butte
Drainage Poison Spring Canyon | Coordinates (D31-13)9bcd *
Sub-drainage | County
Ident. # (Lat.) 38 07 35 (Long.) 110 29 23 | Owner
Topography North side canyon wall

Altitude 4400 Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/21/77 Recorded by H. D. Goode
Remarks:
Did not visit.
* Unsurveyed.
C 6/20/57 , 7/26/76

Reference Number NW-1 | Spring Schedule Henry Mountains Region | Name Copper Basin
Quadrangle Mt Ellen | Coordinates (D32-10)2ada | County Garfield | Owner
Drainage North Wash
Sub-drainage Copper Creek
Ident. # (Lat.) 38 03 21 (Long.) 110 46 00
Topography Gully north slope Copper Ridge

Altitude 8700 | Openings Several
Formation (or kind of rock) Igneous rock over shale
Improvements, use
Discharge 15-20 gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 7/10/1975 1976 Recorded by H. D. Goode
Remarks:
Did not sample or measure.

Reference Number NW-2 nv | Spring Schedule Henry Mountains Region | Name Copper Creek Spg
Quadrangle Mt Ellen | Coordinates (D32-10)2aaa | County Garfield | Owner
Drainage North Wash
Sub-drainage Copper Creek
Ident. # (Lat.) 38 03 34 (Long.) 110 46 04
Topography Gully of Copper Creek

Altitude 8620 | Openings
Formation (or kind of rock)
Improvements, use Supplies creek
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/21/77 Recorded by H. D. Goode
Remarks:
Did not visit spring - measured creek at road
7/10/75 30 gpm M 430 mmhos

Reference Number NW-3 | Spring Schedule Henry Mountains Region | Name Lecleed
Quadrangle Bull Mtn | Coordinates (D31-11)28cbd | County Garfield | Owner
Drainage North Wash
Sub-drainage Crescent Creek
Ident. # (Lat.) 38 04 46 (Long.) 110 42 31
Topography Creek cuts deeply through pediment gravel east of Granite Ridge

Altitude 6420 | Openings Several
Formation (or kind of rock) Alluvium, probably over bedrock dam
Improvements, use Stock
Discharge 30-40 gpm cfs M, (E), R, Temperature 12 °C °F
Conductance 520 m mhos pH
Date of record 7/10/1975 1976 Recorded by H. D. Goode
Remarks:

Reference Number NW-4 | Spring Schedule Henry Mountains Region | Name Death Canyon Spg
Quadrangle Bull Mtn | Coordinates (D32-12)3abd* | County Garfield | Owner
Drainage North Wash
Sub-drainage Death Canyon
Ident. # (Lat.) 38 03 27 (Long.) 110 34 25
Topography Box canyon

Altitude 4860 | Openings
Formation (or kind of rock) Entrada Sandstone
Improvements, use
Discharge 1/4 gpm cfs M, (E), R Temperature 17 °C °F
Conductance 455 m mhos pH
Date of record 1975 8/29/1976 Recorded by H. D. Goode
Remarks:
* Spring misplaced on BLM map.
Vegetation: Salt cedar, wiregrass

Reference Number NW-5 | Spring Schedule Henry Mountains Region | Name Cottonwood Spg
Quadrangle Bull Mtn | Coordinates (D32-11)24aaa | County Garfield | Owner
Drainage North Wash
Sub-drainage Cottonwood Wash
Ident. # (Lat.) 38 00 51 (Long.) 110 38 26
Topography Gully bottom at junction of two gullies.

Altitude 5100 | Openings Many
Formation (or kind of rock) Morrison Sandstone
Improvements, use
Discharge 2 gpm cfs M, (E), R, Temperature 16 °C 60 °F
Conductance 610 m mhos pH
Date of record 8/1/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/1/75
* Temp measured in botoom of main gully. Sample also taken 1/4 mi downstream at a broken pipe (4 gpm M).
(Location of "Cottonwood pipe" sample: 38 00 48 110 38 16; conductance at pipe 830)
Water from Cottonwood Pipe is probably fed by a different spring that was not located. See chemical analyses.

Reference Number NW-6 | Spring Schedule Henry Mountains Region | Name Drinking Cup Spg
Quadrangle Bull Mtn | Coordinates (D32-12)16bdb* | County Garfield | Owner
Drainage North Wash
Sub-drainage Cottonwood Wash
Ident. # (Lat.) 38 01 35 (Long.) 110 35 49
Topography Bottom of wash in shallow bedrock canyon

Altitude 4750 | Openings
Formation (or kind of rock) Entrada (rises from Entrada in Wash bottom)
Improvements, use
Discharge 3 gpm cfs M, (E), R Temperature 23 °C °F
Conductance 625 m mhos pH
Date of record 1975 8/29/ 1976 Recorded by H. D. Goode
Remarks:
* Mislocated on topo and BLM maps.
Vegetation: Wiregrass

Reference Number NW-7 | Spring Schedule Henry Mountains Region | Name Turkey
Quadrangle Bull Mtn | Coordinates (D32-12)1cda | County Garfield | Owner
Drainage North Wash
Sub-drainage Unnamed trib
Ident. # (Lat.) 38 02 52 (Long.) 110 32 26
Topography Side of southward draining gully

Altitude 5020 | Openings
Formation (or kind of rock) Sandstone, water from red sandstone
Improvements, use Fenced collection box; stock
Discharge * gpm cfs M, E, R, Temperature 19 °C °F
Conductance 750 m mhos pH
Date of record 1975 8/29/ 1976 Recorded by H. D. Goode
Remarks:
* No visible flow

Reference Number NW-8 | Spring Schedule Henry Mountains Region | Name Arches Spg North
Quadrangle Fiddler Butte | Coordinates (D31-13)33bad | County Garfield | Owner
Drainage North Wash
Sub-drainage Butler Canyon, unnamed trib
Ident. # (Lat.) 38 04 20 (Long.) 110 29 13
Topography Shelves in thin-bedded sandstone

Altitude 5500 | Openings
Formation (or kind of rock) Carmel Sandstone, water from red over white
Improvements, use 3 tanks, trough, collection box; stock
Discharge < 1/8 gpm cfs M, (E), R Temperature 17 °C °F
Conductance 380 m mhos pH
Date of record 1975 8/29/1976 Recorded by H. D. Goode
Remarks:

Reference Number NW-9 — Spring Schedule Henry Mountains Region

Name Arches Spg South
Quadrangle Fiddler Butte
Coordinates (D31-13)33bad
County Garfield
Owner

Drainage North Wash
Sub-drainage Butler Canyon, unnamed trib
Ident. # (Lat.) 38 04 17 (Long.) 110 29 10
Topography Shelves in thin-bedded sandstone

Altitude 5500 Openings
Formation (or kind of rock) Carmel sandstone, water from red over white
Improvements, use Pipe
Discharge < 1/8 gpm cfs M, (E), R, Temperature 15½°C °F
Conductance 395 m mhos pH
Date of record 1975 8/29/ 1976 Recorded by H. D. Goode
Remarks:

Reference Number NW-13nv — Spring Schedule Henry Mountains Region

Name North Wash Spg
Quadrangle Browns Rim
Coordinates (D33-13)15bdc
County Garfield
Owner

Drainage North Wash
Sub-drainage Mainstream
Ident. # (Lat.) 37 56 12 (Long.) 110 28 11
Topography West side deep North Wash Canyon

Altitude 3900 Openings
Formation (or kind of rock) Wingate Sandstone
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by
Remarks:

C 6/9/63

Reference Number NW-10 — Spring Schedule Henry Mountains Region

Name Hog Spring
Quadrangle Mt Hillers
Coordinates (D32-13)31dbc
County Garfield
Owner BLM

Drainage North Wash
Sub-drainage Hog Canyon
Ident. # (Lat.) 37 58 35 (Long.) 110 31 09
Topography Bottom of Hog Canyon

Altitude 4440 Openings
Formation (or kind of rock) Probably issues from base of Navajo Sandstone
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by
Remarks:

Reference Number NW-11 — Spring Schedule Henry Mountains Region

Name Middle Hog
Quadrangle Mt Hillers
Coordinates (D33-13)5dbc
County Garfield
Owner

Drainage North Wash
Sub-drainage Hog Canyon
Ident. # (Lat.) 37 57 43 (Long.) 110 30 03
Topography Bottom of Hog Canyon at top of Wingate

Altitude 4170 Openings Much seepage
Formation (or kind of rock) Wingate Ss
Improvements, use none
Discharge * gpm cfs M, E, R, Temperature 31 °C °F
Conductance 680 m mhos pH near top of Wingate
Date of record 1975 1976 7/6/77 Recorded by H. D. Goode
Remarks:
Flow increases downstream. Measured twice on 7/6/77 at
waterfall several hundred yds below top of Wingate
7/6/77 12:50 PM 31° 620mmho 6.7gpm M
4:15 PM 33° 650mmho 2.4gpm M

Reference Number NW-12 — Spring Schedule Henry Mountains Region

Name South Hog
Quadrangle Browns Rim
Coordinates (D33-13)4cbc
County
Owner

Drainage North Wash
Sub-drainage Hog Canyon
Ident. # (Lat.) 37 57 44 (Long.) 110 29 31
Topography Bottom of Hog Canyon about 100 yds upstream from picnic ground

Altitude 4090 Openings
Formation (or kind of rock) Fault in Wingate Ss
Improvements, use none
Discharge 5 gpm cfs M, (E), R Temperature 19 °C °F
Conductance 625 m mhos pH
Date of record 1975 1976 7/6/77 Recorded by H. D. Goode
Remarks:
Fault trends about N70W. Displacement about 5 ft SW side up.
Green algae appear in channel at spring.
This spring could supply water for Hog Canyon Picnic Ground.

C 5/13/75

Reference Number TC-1 | Spring Schedule Henry Mountains Region | Name Box Spring
Quadrangle Mt Ellen | Coordinates (D32-10) 21aad | County Garfield | Owner
Drainage Trachyte
Sub-drainage Slate, unnamed trib
Ident. # (Lat.) 38 00 44 (Long.) 110 48 13
Topography Saddle between Mt Ellen on north and The Horn on the south

Altitude 7750 Openings Seep
Formation (or kind of rock) Colluvium
Improvements, use Pipe, trough - stock
Discharge * gpm cfs (M), E, R, Temperature 11 °C 52 °F
Conductance 600 m mhos pH
Date of record 6/30/1975 7/11/1976 Recorded by H. D. Coode
Remarks:

Date	* Discharge		
6/30/75	1 qt 65 sec	M	
7/8/75	5 qts 310 sec	M	
7/10/75	1 qt 60 sec	M	
7/11/76	1 qt 90 sec	M	57°F
7/4/77	1qt 140 sec	M	14°C 600mmho

Reference Number TC-2 | Spring Schedule Henry Mountains Region | Name Cougar Spring
Quadrangle Mt Ellen | Coordinates (D32-10) 13bcb | County Garfield | Owner
Drainage Trachyte
Sub-drainage State Creek, unnamed trib
Ident. # (Lat.) 38 01 35 (Long.) 110 46 00
Topography Saddle northwest of Ragged Mtn

Altitude 8760 Openings
Formation (or kind of rock) Igneoua rock or igneous colluvium over Tununk Shale
Improvements, use
Discharge 1/4 * gpm cfs M, (E), R Temperature 11 °C °F
Conductance 680 m mhos pH
Date of record 1975 7/15/ 1976 Recorded by H. D. Goode
Remarks:
* Partial measurement

Reference Number TC-3 | Spring Schedule Henry Mountains Region | Name Horn Spring
Quadrangle Mt Pennell | Coordinates (D32-10) 34bac | County Carfield | Owner
Drainage Trachyte
Sub-drainage Slate, unnamed trib
Ident. # (Lat.) 37 59 07 (Long.) 110 47 50
Topography North-facing alope of Mt Pennell

Altitude 8670 Openings Seepa
Formation (or kind of rock) Colluvium
Improvements, use Pipe, collection box, pond; stock
Discharge 1-2* gpm cfs (M), E, R, Temperature 12 °C °F
Conductance 460 m mhos pH
Date of record 7/10/ 1975 1976 Recorded by H. D. Goode
Remarks:

Date	Discharge		C°
7/17/75	5 qts/min	M	
7/8/75 4:15 P	9/qts/min	M	11.5
7/9/75 8:45 A	10 qts/min	M	12 (after heavy rain all night)
7/10/75 9:15 A	7 qts/min	M	12

Vegetation: Crassy slope

Reference Number TC-4 nv | Spring Schedule Henry Mountains Region | Name Unnamed
Quadrangle Mt Pennell | Coordinates (D32-10) 26bdb | County Carfield | Owner
Drainage Trachyte
Sub-drainage Slate, unnamed trib
Ident. # (Lat.) 37 59 52 (Long.) 110 46 48
Topography Bottom of canyon

Altitude 7700 Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/27/77 Recorded by H. D. Coode
Remarks:
Shown on BLM map; does not show on aerial photos.
Did not visit.

Reference Number TC-5 | Spring Schedule Henry Mountains Region | Name Hancock Spring
Quadrangle Mt Pennell | Coordinates (D32-10) 34dbb | County Garfield | Owner Near BLM cabin
Drainage Trachyte
Sub-drainage Slate Creek - Black Canyon
Ident. # (Lat.) 37 58 47 (Long.) 110 47 33
Topography NE facing colluvial slope

Altitude 9030 Openings Several
Formation (or kind of rock) Colluvium
Improvements, use Pipe captures part of flow; tank, camper, BLM cabin
Discharge 15-20* gpm cfs M, (E), R, Temperature 5 °C °F
Conductance 350 m mhos pH
Date of record 7/8/ 1975 7/11/1976 Recorded by H. D. Goode
Remarks: C 7/8/75, 8/14/75 Vegetation: Aspen and ponderosa

Date	*Flow from pipe		°C	Cond	Uncaptured
7/8/75	10 gpm	M	5	350	8 gpm M
7/9/75	10 gpm	M	5.5 (After all night rain)		
7/10/75	10 gpm	M	5	350	
8/14/75	6.7	M	5	375	
7/11/76	6.7	M	5.5	400	
7/4/77	6°C		440mmho		

1.5gpm M at enclosed pipe.
Trough has been moved about 100 ft downslope.
Uncaptured spring area yields 1-2gpm E

Reference Number TC-6 | Spring Schedule Henry Mountains Region | Name Black Canyon Spg
Quadrangle Mt Pennell | Coordinates (D32-10) 35bcc | County Garfield | Owner
Drainage Trachyte
Sub-drainage Slate - Black Canyon
Ident. # (Lat.) 37 58 49 (Long.) 110 47 04
Topography Junction two canyons

Altitude 8560 Openings
Formation (or kind of rock) Valley Fill
Improvements, use Stock
Discharge 30 gpm cfs M, (E), R Temperature 4 °C °F
Conductance 170 m mhos pH
Date of record 8/16/1975 1976 Recorded by H. D. Goode
Remarks:
C 8/16/75
Flow disappears into rubbly creek bottom about 150 yds below orifice.
Vegetation: Oak, Ponderoaa

Reference Number TC-7 | Spring Schedule Henry Mountains Region | Name Gibbons
Quadrangle Mt Pennell | Coordinates (D32-10) 35aad | County Garfield | Owner
Drainage Trachyte
Sub-drainage Slate, unnamed trib
Ident. # (Lat.) 37 59 01 (Long.) 110 46 02
Topography NE slope Mt Pennell

Altitude 8100 Openings Seeps
Formation (or kind of rock) Colluvium over Tununk Shale
Improvements, use Stock
Discharge 23 gpm cfs (M), E, R, Temperature 8 °C °F
Conductance m mhos Weir pH
Date of record 7/9/ 1975 7/11/ 1976 Recorded by H. D. Goode
Remarks:
Measured with v-notch weir
7/11/76 Outflow greater than in 1975 5 gpm or more crossing road.
Vegetation: Willows

Reference Number TC-8 | Spring Schedule Henry Mountains Region | Name Tank Spring
Quadrangle Mt Pennell | Coordinates (D32-10) 36bcd | County Carfield | Owner
Drainage Trachyte
Sub-drainage Slate Creek, Left fork Slate Creek
Ident. # (Lat.) 37 58 49 (Long.) 110 45 49
Topography Gentle northeast slope Mt Pennell

Altitude 8140 Openings 1
Formation (or kind of rock) Colluvium over Tununk Shale
Improvements, use Tank, Stock
Discharge 5* gpm cfs M, (E), R Temperature 8 °C °F
Conductance 700 m mhos pH
Date of record 8/16/ 1975 7/11/ 1976 Recorded by H. D. Goode
Remarks:
* Measured 4 gpm into tank + Est 1 gpm into pond.
7/11/76 7°C 675 mmho 3 gpm into tank + 2-3 gpm into pond.
Vegetation: Aspen
7/4/77 8°C 680mmho 2.4gpm M into tank, none into pond

Reference Number TC-9 | Spring Schedule Henry Mountains Region | Name Willow
Quadrangle Mt Pennell | Coordinates (D32-10)35dcc | County Garfield | Owner
Drainage Trachyte
Sub-drainage Coyote Creek, unnamed trib
Ident. # (Lat.) 37 58 28 (Long.) 110 46 26
Topography Shallow swale on NE slope Mt Pennell

Altitude 8750 Openings Seeps
Formation (or kind of rock) Colluvium over Tununk shale
Improvements, use Pipe, stock
Oischarge * gpm cfs M, E, R, Temperature 6 °C °F
Conductance 350 m mhos pH
Oate of record 7/ 9/ 1975 7/11/ 1976 Recorded by H. D. Goode
8/16/1975
Remarks:

Date	* Discharge	
7/9/75	21 gpm M weir	Only small part of yield discharges from pipe.
8/16/75	5 gpm M weir	
7/11/76	Est 5-7 gpm at road (Road was dry in 1975)	

Vegetation: Willows
C 7/9/75

Reference Number TC-10 | Spring Schedule Henry Mountains Region | Name Browns Hole
Quadrangle Mt Pennell | Coordinates (D33-10)13aca | County Garfield | Owner
Drainage Trachyte
Sub-drainage Straight - Browns Creek
Ident. # (Lat.) 37 56 19 (Long.) 110 45 17
Topography Rises in gully east face Mt Pennell In 1977 a seep north of main channel yielded more than main channel.

Altitude 7740 Openings Several seeps
Formation (or kind of rock) Alluvium, colluvium
Improvements, use Stock
Discharge * gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Oate of record 7/9/ 1975 7/11/ 1976 Recorded by H. D. Goode
Remarks:

	* Discharge
* 7/9/75	15-20 gpm E
* 7/11/76	6°C 350 mmho 36 gpm M
7/4/77	11°C 380mmho <1gpm E; dry where measured in 1976

North orifice 7/4/77 14.5 370mmho 1gpm E

Reference Number TC-11 | Spring Schedule Henry Mountains Region | Name Wolverton Springs
Quadrangle Mt Hillers | Coordinates (D33-11)4cad | County Garfield | Owner
Drainage Trachyte
Sub-drainage Straight Creek, unnamed trib
Ident. # (Lat.) 37 57 44 (Long.) 110 42 18
Topography Break in pediment (Coyote Bench)

Altitude 6370 Openings 4 springs
Formation (or kind of rock) Pediment gravel over Tununk Shale
Improvements, use
Discharge 3 * gpm cfs M, E, R, Temperature 12 °C °F
Conductance 440 m mhos pH
Date of record 8/16/1975 1976 Recorded by H. D. Goode
Remarks:
North most spring plotted

* South Spring 12°C 440 mmho Est 1 gpm
North Spring 12°C 440 mmho Est 1 gpm
Third Spring 11°C 420 mmho Est 1 gpm
Fourth Spring in area
Vegetation: Juniper and brush

Reference Number TC-12 | Spring Schedule Henry Mountains Region | Name Spg above Bastian Res
Quadrangle Mt Hillers | Coordinates (D31-11)28abb | County Garfield | Owner
Orainage Trachyte unnamed trib
Sub-drainage Straight Creek - Quaking Aspen Creek,
Ident. # (Lat.) 37 54 50 (Long.) 110 42 04
Topography North slope Cass Creek Peak

Altitude 7670 Openings
Formation (or kind of rock) Colluvium over white clay (altered igneous ?)
Improvements, use
Oischarge 22 gpm cfs (M), E, R Temperature 3 °C 38 °F
Conductance 140 m mhos pH
Date of record 8/2/ 1975 1976 Recorded by H. D. Goode
Remarks:
Vegetation: Aspen, ponderosa

Reference Number TC-13 | Spring Schedule Henry Mountains Region | Name Dead Frog Spring
Quadrangle Mt Hillers | Coordinates (D31-11)21cca | County Garfield | Owner
Drainage Trachyte
Sub-drainage Straight Creek - Quaking Aspen Creek
Ident. # (Lat.) 37 55 00 (Long.) 110 42 31
Topography North slope Cass Creek Peak

Altitude 7420 Openings 1
Formation (or kind of rock) From talus
Improvements, use Flows to reservoir; stock
Oischarge 2-3 gpm cfs M, (E), R, Temperature 2 °C 36 °F
Conductance 110 m mhos pH
Date of record 8/2/ 1975 1976 Recorded by H. D. Goode
Remarks:
Water obviously derived from melting snow or ice deep in talus.

Reference Number TC-14 | Spring Schedule Henry Mountains Region | Name Quaking Aspen Spg
Quadrangle Mt Hillers | Coordinates (D33-11)21bcd | County Garfield | Owner
Orainage Trachyte Creek
Sub-drainage Straight Creek- Quaking Aspen Creek
Ident. # (Lat.) 37 55 21 (Long.) 110 42 32
Topography North slope Cass Creek Peak

Altitude 7060 Openings
Formation (or kind of rock) Colluvium
Improvements, use Wood housing, stock
Discharge 25-30 gpm cfs M, (E), R Temperature 8 °C 46 °F
Conductance 420 m mhos pH
Date of record 8/1/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/1/75

Reference Number TC-15 | Spring Schedule Henry Mountains Region | Name Benson Spring
Quadrangle Mt Hillers | Coordinates (D33-11)15cad | County Garfield | Owner
Drainage Trachyte
Sub-drainage Straight Creek - Benson Creek
Ident. # (Lat.) 37 56 04 (Long.) 110 41 10
Topography North slope Big Ridge

Altitude 6740 Openings 1
Formation (or kind of rock) Colluvium on layer of clay
Improvements, use Ditch; stock, perhaps irrigation
Oischarge 170 gpm cfs (M), E, R, Temperature 9 °C 48 °F
Conductance 185 m mhos pH
Oate of record 8/2/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/2/75
Heavily vegetated

7/5/77 Collection box and 2-mile pipeline to ranch added since 1975. Overflow from box - 11.5°C 180mmho 4.8gpm M
Pipeline was traced to valve and discharge from pipe was measured:

14°C 180mmho 100gpm M

Reference Number TC-16 | Spring Schedule Henry Mountains Region | Name Maidenwater Spg
Quadrangle Mt Hillers | Coordinates (D33-12)27bdb* | County Garfield | Owner
Drainage Trachyte
Sub-drainage Maidenwater Creek, unnamed trib
Ident. # (Lat.) 37 54 33 (Long.) 110 34 41
Topography Junction two tributaries

Altitude 4780 Openings
Formation (or kind of rock) Channel Alluvium in Entrada Sandstone
Improvements, use Stock
Discharge 1 gpm cfs M, (E), R Temperature 19 °C °F
Conductance 580 m mhos pH
Oate of record 1975 7/25/ 1976 Recorded by H. D. Goode
Remarks:
Mislocated about 200 yds on BLM map.

Reference Number TC-17 nv — Spring Schedule Henry Mountains Region

Name Maidenwater Creek
Quadrangle Mt Hillers
Coordinates (D33-12)33bdd
County Garfield
Owner

Drainage Trachyte
Sub-drainage Maidenwater
Ident. # (Lat.) 37 53 35 (Long.) 110 35 39
Topography Box canyon

Altitude 5120 Openings
Formation (or kind of rock) Possibly Morrison
Improvements, use
Oischarge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/27/77 Recorded by H. D. Goode
Remarks:
Shows on BLM map and on topo map. Not clear on air photos.
Did not visit, difficult access.

Reference Number TC-18 nv — Spring Schedule Henry Mountains Region

Name Gold Creek
Quadrangle Mt Hillers
Coordinates (D34-11)2aaa
County Garfield
Owner

Drainage Trachyte
Sub-drainage Gold Creek
Ident. # (Lat.) 37 53 03 (Long.) 110 39 28
Topography Canyon off east slope of Mt Hillers

Altitude 6950 Openings
Formation (or kind of rock) Probably rises on igneous rock
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 Recorded by H. D. Goode
Remarks:
Did not visit. Remote, no evidence of downstream flow.

Reference Number TC-19 — Spring Schedule Henry Mountains Region

Name Woodruff Mine
Quadrangle Mt Hillers
Coordinates (D34-12)8cba
County Garfield
Owner

Drainage Trachyte
Sub-drainage Woodruff Hole Creek
Ident. # (Lat.) 37 51 58 (Long.) 110 37 05
Topography Break in pediment east slope Mt Hillers

Altitude 5680 Openings 2 springs (east & west)
Formation (or kind of rock) Pediment over Morrison
Improvements, use Pipe; stock, domestic, irrigation
Oischarge ** gpm cfs M, E, R, Temperature 13 °C* °F
Conductance 260* m mhos pH
Oate of record 8/3/ 1975 1976 Recorded by H. D. Goode
Remarks:
* Temperature and conductance at east spring; West spring 16°C 380 mmho.
** Probably yields more than 20 gpm.

Reference Number TC-20 — Spring Schedule Henry Mountains Region

Name Hole Spring
Quadrangle Mt Hillers
Coordinates (D34-12)10cbd
County Garfield
Owner

Drainage Trachyte
Sub-drainage Woodruff Hole Creek
Ident. # (Lat.) 37 51 51 (Long.) 110 34 50
Topography Creek bottom

Altitude 4540 Openings
Formation (or kind of rock) Alluvium over Entrada
Improvements, use
Discharge 1-2* gpm cfs M, (E), R Temperature 22 °C °F
Conductance 800 m mhos pH
Oate of record 8/3/ 1975 1976 Recorded by H. D. Goode
Remarks:
* No visible flow at spring site but lots of vegetation. Downstream about 200 yeds flow of 1-2 gpm comes out of alluvium.

Reference Number TC-21 — Spring Schedule Henry Mountains Region

Name Starr Spring
Quadrangle Mt Hillers
Coordinates (D34-11)14dbb
County Garfield
Owner USBLM; used at campground

Orainage Trachyte
Sub-drainage Swett Creek, Star Creek
Ident. # (Lat.) 37 51 03 (Long.) 110 39 53
Topography Landslides south slope Mt Hillers

Altitude 6280 Openings
Formation (or kind of rock) Landslide over Mancos Shale
Improvements, use Collection box, distribution system, faucets
Discharge 85-90* gpm cfs (M), E, R, Temperature 16 °C °F
Conductance 305 m mhos pH
Oate of record 8/3/ 1975 1976 Recorded by H. D. Goode
Remarks: C 8/3/75 C 5/13/75
* Discharge was overflow only; measured at campground about 1/4 mi below spring area (37 51 02; 110 39 33)
7/8/76 16.5°C 300 mmho 11 gpm Same measuring
7/25/76 15°C 310 mmho 43 gpm point.
7/6/77 No overflow at campground.
Faucet: 26°C 310mmho
New sign: "Water purified by iodinator"

Reference Number TC-22 — Spring Schedule Henry Mountains Region

Name Stock Spring
Quadrangle Mt Hillers
Coordinates (D34-11)24bbd
County Garfield
Owner

Drainage Trachyte
Sub-drainage Swett Creek, Star Creek
Ident. # (Lat.) 37 50 33 (Long.) 110 39 09
Topography Gentle south slope off Mt Hillers

Altitude 5900 Openings
Formation (or kind of rock)
Improvements, use Tanks, pipe; stock corral
Discharge 2-3 gpm cfs M, (E), R Temperature 22 °C °F
Conductance 320 m mhos pH
Date of record 8/4/ 1975 1976 Recorded by H. D. Goode
Remarks:
Water may come from Star Spring.

Reference Number LR-1 — Spring Schedule Henry Mountains Region

Name Fourmile Spg
Quadrangle Mt Hillers
Coordinates (D35-12)9cdd
County Garfield
Owner

Drainage Fourmile Canyon
Sub-drainage
Ident. # (Lat.) 37 46 25 (Long.) 110 35 43
Topography Canyon bottom

Altitude 5210 Openings Seep
Formation (or kind of rock) Navajo, at top of Kayenta
Improvements, use
Discharge < 1/8 gpm cfs M, (E), R, Temperature 17 °C °F
Conductance 500 m mhos pH
Date of record 1975 8/30/ 1976 Recorded by H. D. Goode
Remarks:
Abundant vegetation - may yield more water at times.
Vegetation: Cottonwood, wire grass, salt cedar, pine

Reference Number LR-2 — Spring Schedule Henry Mountains Region

Name Ticaboo Shelf
Quadrangle Mt Ellsworth
Coordinates (D35½-12)27cca
County Carfield
Owner

Drainage Ticaboo Creek
Sub-drainage South Fork Ticaboo Creek, unnamed trib
Ident. # (Lat.) 37 42 06 (Long.) 110 34 48
Topography Below mesa surface south side of canyon

Altitude 4820 Openings 1
Formation (or kind of rock) Carmel (white sandstone)
Improvements, use Collection box, storage tank, trough; stock
Discharge < 1/4 gpm cfs M, (E), R Temperature 24 °C °F
Conductance 440 m mhos pH
Date of record 8/18/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/18/75

Reference Number LR-3 — Spring Schedule Henry Mountains Region

Name Colt Spring
Quadrangle Mt Ellsworth
Coordinates (D35½-12)33ccb
County Carfield
Owner

Drainage Smith Fork
Sub-drainage
Ident. # (Lat.) 37 41 18 (Long.) 110 36 06
Topography Arroyo in bedrock

Altitude 4780 Openings
Formation (or kind of rock) Carmel (white sandstone)
Improvements, use Tank, trough; stock
Discharge trickle gpm cfs M, (E), R, Temperature 21 °C °F
Conductance 460 m mhos pH
Date of record 8/18/ 1975 1976 Recorded by H. D. Goode
Remarks:
Vegetation: Salt cedar

Reference Number LR-4 — Spring Schedule Henry Mountains Region

Name Wild Colt Spring
Quadrangle Mt Ellsworth
Coordinates (D36-12)5dsa
County Garfield
Owner

Drainage Smith Fork
Sub-drainage
Ident. # (Lat.) 37 40 53 (Long.) 110 36 08
Topography Bresk in bench surfsce

Altitude 4760 Openings
Formation (or kind of rock) Contsct Entrada over Carmel
Improvements, use Trough
Discharge 0 gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 8/18/ 1975 1976 Recorded by H. D. Goode
Remarks:
No wster, six cottonwoods.
Hss BLM mark of Colt spring.

Reference Number LR-5 — Spring Schedule Henry Mountains Region

Name Wild Horse Spg
Quadrangle Mt Ellsworth
Coordinates (D36-12)5ddd*
County Carfield
Owner

Drainage Smith Fork
Sub-drainage Smith Fork
Ident. # (Lat.) 37 40 45 (Long.) 110 36 10
Topography Gentle slope

Altitude 4710 Openings
Formation (or kind of rock) Carmel (white sandstone)
Improvements, use Trough
Discharge 0 gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 8/18/ 1975 1976 Recorded by H. D. Coode
Remarks:
Dry. * BLM map shows Wild Horse Spring in sec 4;
BLM marker at spring shows sec 5.
Vegetation: Dead cottonwood

Reference Number LR-6 — Spring Schedule Henry Mountains Region

Name Mule Spring
Quadrangle Mt Ellsworth
Coordinates (D36-12)8aaa*
County Carfield
Owner

Drainage Smith Fork
Sub-drainage Smith Fork
Ident. # (Lat.) 37 40 41 (Long.) 110 36 06
Topography Gentle slope

Altitude 4690 Openings
Formation (or kind of rock) Carmel (white sandstone)
Improvements, use Fenced enclosure, small open tank - full
Discharge trickle gpm cfs M, (E), R Temperature 23 °C °F
Conductance 475 m mhos pH
Date of record 8/18/ 1975 1976 Recorded by H. D. Goode
Remarks:
Tufa deposit 5 ft thick 100 yds downstream.
* This spring shown on BLM map in sec 9.

Reference Number HC-1 | Spring Schedule Henry Mountains Region | Name Squaw Spring
Quadrangle Mt Hillers
Drainage Hansen Creek | Coordinates (D34-11)8cca
Sub-drainage Hansen Creek | County Garfield
Ident. # (Lat.) 37 51 41 (Long.) 110 43 40 | Dwner
Topography Gentle slope

Altitude 6690 Dpenings
Formation (or kind of rock) Colluvium over clay in Tununk Shale
Improvements, use Pond; stock
Discharge 15 gpm cfs (M), E, R, Temperature 16 °C °F
Conductance 360 m mhos pH
Date of record 8/3/ 1975 7/9/ 1976 Recorded by H. D. Goode
Remarks:
7/9/76 27°C 320 mmho 18 gpm
7/5/77 no flow; pond dry

Reference Number HC-2 | Spring Schedule Henry Mountains Region | Name Papoose Spg W
Quadrangle Mt Hillers
Drainage Hansen Creek | Coordinates (D34-11)18ccb
Sub-drainage Unnamed trib | County Garfield
Ident. # (Lat.) 37 50 46 (Long.) 110 44 46 | Dwner
Topography Edge of pediment

Altitude 5920 Dpenings
Formation (or kind of rock) Pediment gravel on Tununk Shale
Improvements, use Stock
Discharge 1/8 gpm cfs M, (E), R Temperature 17 °C °F
Conductance 420 m mhos pH
Date of record 1975 7/9/ 1976 Recorded by H. D. Goode
Remarks:

Reference Number HC-3 | Spring Schedule Henry Mountains Region | Name Papoose Spg E
Quadrangle Mt Hillers
Drainage Hansen Creek | Coordinates (D34-11)18ccd **
Sub-drainage Unnamed trib | County Garfield
Ident. # (Lat.) 37 50 45 (Long.) 110 44 37 | Dwner
Topography Edge of pediment

Altitude 5920 Dpenings
Formation (or kind of rock) Pediment gravel on Tununk Shale
Improvements, use Collection box, trough; stock
Discharge 1 * gpm cfs M, (E), R, Temperature 19 °C °F
Conductance 430 m mhos pH
Date of record 1975 7/9/ 1976 Recorded by H. D. Goode
Remarks:
* Water measured in collection box, overflow not captured is at least 1 gpm.
** BLM marker at spring shows location as NW¼ NW¼ sec 19, T34S, R11E.
Vegetation: Wiregrass

Reference Number HC-4 | Spring Schedule Henry Mountains Region | Name Copper Creek Spg
Quadrangle Mt Hillers
Drainage Hansen | Coordinates (D34-11)16dbd
Sub-drainage Copper Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 50 54 (Long.) 110 42 01 | Dwner
Topography Creek bottom beside road

Altitude 6180 Dpenings
Formation (or kind of rock) Alluvium probably over shale
Improvements, use
Discharge 5 gpm cfs M, (E), R Temperature 14 °C °F
Conductance 400 m mhos pH
Date of record 8/3/ 1975 1976 Recorded by H. D. Goode
Remarks:
Sign at road shows Copper Creek - Topo map shows Copper Creek 1/2 mile to east.

Reference Number HC-5 | Spring Schedule Henry Mountains Region | Name Copper Spring
Quadrangle Mt Hillers
Drainage Hansen Creek | Coordinates (D34-11)16ccb
Sub-drainage Copper Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 50 52 (Long.) 110 42 35 | Dwner
Topography West side stream channel 800 ft above road

Altitude 6140 Dpenings
Formation (or kind of rock) Sandstone or colluvium over shale
Improvements, use
Discharge 2 gpm cfs M, (E), R, Temperature 16 °C °F
Conductance 760 m mhos pH
Date of record 8/3/ 1975 1976 Recorded by H. D. Goode
Remarks:
BLM map shows spring at road; it is about 1/3 mi above road.

Reference Number HC-6 | Spring Schedule Henry Mountains Region | Name
Quadrangle Mt Hillers
Drainage Hansen Creek | Coordinates (D34-11)29cdc *
Sub-drainage Copper Creek | County Garfield
Ident. # (Lat.) 37 48 59 (Long.) 110 43 31 | Dwner
Topography Stream bottom

Altitude 5120 Dpenings
Formation (or kind of rock)
Improvements, use
Discharge 4-5 gpm cfs M, (E), R Temperature 15 °C °F
Conductance 2200 m mhos pH
Date of record 8/4/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/4/75
* Spring shown on BLM map in sec 32 does not exist. Identification number above gives location where sample was collected. Water probably comes from Sandstone bed about 200 ft above and 1/4 mi from collection point. Probable location of spring (D34-11)29cbc.

Reference Number HC-7 | Spring Schedule Henry Mountains Region | Name Thompson Spg
Quadrangle Hall Mesa
Drainage Hansen Creek | Coordinates (D35-10)35aab
Sub-drainage Thompson Canyon | County Garfield
Ident. # (Lat.) 37 43 42 (Long.) 110 46 10 | Owner
Topography Alcove in sandstone ledge

Altitude 4620 Dpenings
Formation (or kind of rock) Dakota sandstone
Improvements, use
Discharge 0 gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 8/4/ 1975 1976 Recorded by H. D. Goode
Remarks:
Dry
In past water came out of base of Sandstone above shale in east facing Alcove.

Reference Number HC-8 | Spring Schedule Henry Mountains Region | Name Honey Pots
Quadrangle Mt Ellsworth
Drainage Hansen | Coordinates (D36-11)6aca *
Sub-drainage Thompson Canyon | County Garfield
Ident. # (Lat.) 37 42 38 (Long.) 110 44 24 | Owner
Topography Bottom of bedrock canyon

Altitude 4260 Dpenings
Formation (or kind of rock) Sandstone on grey clay (Morrison)
Improvements, use
Discharge 2 gpm cfs M, (E), R Temperature 23 °C °F
Conductance 3000 m mhos pH
Date of record 8/17/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/17/75
Forms alcove in stream channel.
* BLM map showa spring about 1/4 mi east of actual location.

Reference Number HC-9 | Spring Schedule Henry Mountains Region | Name Chucker Spg
Quadrangle Mt Hillers
Drainage Hansen Creek | Coordinates (D34-11)27bbb
Sub-drainage Shitamaring, unnamed trib | County Garfield
Ident. # (Lat.) 37 49 48 (Long.) 110 41 35 | Owner
Topography Creek channel in pediment gravel southwest of Mt Hillers

Altitude 5770 | Openings
Formation (or kind of rock) Pediment gravel over Tununk Shale
Improvements, use
Discharge 0 gpm cfs M, E, R, | Temperature 18 °C °F
Conductance m mhos | pH
Date of record 1975 7/9/ 1976 | Recorded by H. D. Goode
Remarks:
Wire graaa, three large cottonwoods.
Stagnant water only in channel bottom.

Reference Number HC-10 | Spring Schedule Henry Mountains Region | Name Shitamaring Seep
Quadrangle Mt Hillers
Drainage Hansen | Coordinates (D35-11)21abb
Sub-drainage Shitamaring Creek | County Garfield
Ident. # (Lat.) 37 45 23 (Long.) 110 42 08 | Owner
Topography Bulldozer cut through bedrock

Altitude 4480 | Openings
Formation (or kind of rock) Summerville silty bed near base of Summerville
Improvements, use
Discharge < 1 gpm cfs M, (E), R | Temperature 22 °C °F
Conductance 3600 m mhos | pH
Date of record 1975 8/30/ 1976 | Recorded by H. D. Goode
Remarks:

Reference Number HC-11 | Spring Schedule Henry Mountains Region | Name Shitamaring Pond
Quadrangle Mt Ellsworth
Drainage Hanaen Creek | Coordinates (035-11)33cba
Sub-drainage Sitamaring Creek | County Garfield
Ident. # (Lat.) 37 43 14 (Long.) 110 42 32 | Owner
Topography Bedrock outcrop beaide alluvial valley

Altitude 4250 | Dpenings
Formation (or kind of rock) Entrada or alluvium
Improvements, use Bulldozed pond
Discharge - * gpm cfs M, E, R, | Temperature 23½ °C °F
Conductance 4600 m mhos | pH
Date of record 1975 8/30/ 1976 | Recorded by H. D. Goode
Remarks:
* No viaible flow; aeepage may come from Entrada or channel underflow.

Reference Number HC-12 | Spring Schedule Henry Mountains Region | Name Loat Spring
Quadrangle Mt Ellaworth
Drainage Hanaen | Coordinates (D35-11) 34cbb
Sub-drainage Shitamaring, Lost Spring Waah | County Garfield
Ident. # (Lat.) 37 43 15 (Long.) 110 41 36 | Owner
Topography Alcove in Entrada

Altitude 4460 | Dpenings
Formation (or kind of rock) Entrada
Improvements, use Ory trough
Discharge 0 gpm cfs M, E, R | Temperature °C °F
Conductance m mhos | pH
Date of record 8/7/ 1975 1976 | Recorded by H. O. Goode
Remarks:
Vegetation: Willowa

Reference Number HC-13 | Spring Schedule Henry Mountains Region | Name Ant Knoll Spring
Quadrangle Mt Ellsworth
Drainage Hanaen | Coordinates (D36-11)9adb
Sub-drainage Shitamaring, unnamed | County Garfield
Ident. # (Lat.) 37 41 46 (Long.) 110 41 39 | Dwner
Topography Deep alcove near Ant Knoll

Altitude 4300 | Dpenings
Formation (or kind of rock) Entrada
Improvements, use
Discharge 0 gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos | pH
Date of record 8/17/ 1975 1976 | Recorded by H. O. Goode
Remarks:
No flow. Salt Cedar

Reference Number HC-14 | Spring Schedule Henry Mountains Region | Name Point Bar Spring
Quadrangle Mt Ellsworth
Drainage Hansen | Coordinates (D36-11)29abc
Sub-drainage | County Garfield
Ident. # (Lat.) 37 39 13 (Long.) 110 43 07 | Dwner
Topography Bend in stream channel

Altitude 3970 | Dpenings
Formation (or kind of rock) Water rises from point bar deposits oppposite bedrock outcrop.
Improvements, use
Discharge Seepage gpm cfs M, E, R | Temperature 30 °C °F
Conductance 2600 m mhos | pH
Date of record 8/17/ 1975 1976 | Recorded by H. D. Goode
Remarks:

Reference Number HC-15 | Spring Schedule Henry Mountains Region | Name Mill Race Spg
Quadrangle Mt Ellsworth
Drainage Hansen | Coordinates (D36-11)32cad*
Sub-drainage | County Garfield
Ident. # (Lat.) 37 37 54 (Long.) 110 43 09 | Owner
Topography Stream channel

Altitude 3890 | Openings
Formation (or kind of rock) Stream channel, probably above bedrock barrier
Improvements, use
Discharge 5 gpm cfs M, (E), R, | Temperature 25 °C °F
Conductance 4000 m mhos | pH
Date of record 8/17/1975 1976 | Recorded by H. D. Goode
Remarks:
C 8/17/75
* BLM map ahows spring about 1/3 mi north of its actual location.

Reference Number HC-16 | Spring Schedule Henry Mountains Region | Name Cane Spring
Quadrangle Mt Ellaworth
Drainage Hanaen Creek | Coordinates (037-11)9bac
Sub-drainage Hansen | County Garfield
Ident. # (Lat.) 37 36 38 (Long.) 110 42 18 | Owner
Topography Eaat aide stream channel

Altitude 3820 | Dpenings
Formation (or kind of rock) Sandstone over ailtstone
Improvements, use
Discharge 0 gpm cfs M, E, R | Temperature °C °F
Conductance m mhos | pH
Date of record 8/17/ 1975 1976 | Recorded by H. O. Goode
Remarks:
Water riaes from stream channel below presumed spring aite
Est 2 gpm 23° 3600 mmhoa.

Reference Number HC-17 | Spring Schedule Henry Mountains Region | Name Wolf Spring

Quadrangle Mt Ellsworth

Drainage Hanaen Creek

Coordinates (D37-11) 34acd*

Sub-drainage Hansen Creek

County Garfield

Ident. # (Lat.) 37 32 56 (Long.) 110 40 46

Owner

Topography Alcove in bedrock

Altitude 3720 Openings

Formation (or kind of rock) 20 ft below white sandstone in Carmel

Improvements, use Pipe - (BLM marker)

Discharge gpm cfs M, E, R, Temperature °C °F

Conductance m mhos pH

Date of record 8/18/1975 1976 Recorded by H. D. Goode

Remarks:

Dry

*Miaplaced about 300 yds on BLM map.

Reference Number Bf-1 | Spring Schedule Henry Mountains Region | Name Buffalo Canyon
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 9bdb*
Sub-drainage Buffalo
County Garfield
Ident. # (Lat.) 38 02 27 (Long.) 110 48 57
Owner
Topography Valley Bottom

Altitude 8600 Openings
Formation (or kind of rock) Colluvium
Improvements, use
Discharge 4 gpm cfs (M), F, R, Temperature 10 °C °F
Conductance 570 m mhos pH
Date of record 1975 7/16/ 1976 Recorded by H. D. Goode
Remarks:
Side Spring from south 15°C 1180 mmho 1 gpm E
* This spring is nearly 1/2 mile upstream from location shown on BLM map.
Vegetation: Aspen

Reference Number Bf-2 | Spring Schedule Henry Mountains Region | Name Buffalo Seep
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 8ddd
Sub-drainage Buffalo, unnamed trib
County Garfield
Ident. # (Lat.) 38 01 53 (Long.) 110 49 27
Owner
Topography South-trending gully

Altitude 8090 Openings
Formation (or kind of rock) Colluvial slope over Tununk Shale
Improvements, use
Discharge < 1/16 gpm cfs M, (F), R Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/15/ 1976 Recorded by H. D. Goode
Remarks:

Reference Number Bf-3 | Spring Schedule Henry Mountains Region | Name Roadside Seep
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 8ddb
Sub-drainage Buffalo, unnamed trib
County Garfield
Ident. # (Lat.) 38 02 03 (Long.) 110 49 33
Owner
Topography Gentle slope, north of road

Altitude 8220 Openings
Formation (or kind of rock) Colluvium
Improvements, use
Discharge 0 gpm cfs M, F, R, Temperature 25 °C °F
Conductance 480 m mhos pH
Date of record 8/14/ 1975 1976 Recorded by H. D. Goode
Remarks:
No flow; may be capable of yielding 1-2 qts/min
Vegetation: Stand of small oaks

Reference Number Bf-4 | Spring Schedule Henry Mountains Region | Name Airplane Spring
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 21ccc
Sub-drainage Buffalo, unnamed trib
County Garfield
Ident. # (Lat.) 38 00 06 (Long.) 110 49 12
Owner
Topography Gentle swale near Pennellen Pass

Altitude 7680 Openings
Formation (or kind of rock) Probably colluvium over shale
Improvements, use Collection box, faucet, fence, trough; stock and camping
Discharge * gpm cfs M, F, R Temperature 11 °C °F
Conductance 700 m mhos pH
Date of record 8/14/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/14/75
* Probably can yield 5 to 10 gpm.
7/4/77 15°C 660mmho Measured in trough, no flow from faucet

Reference Number Bf-5 | Spring Schedule Henry Mountains Region | Name Stockseep
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 29bba*
Sub-drainage Buffalo, unnamed trib
County Garfield
Ident. # (Lat.) 38 00 03 (Long.) 110 50 16
Owner
Topography Shallow gully

Altitude 7040 Openings Seep area
Formation (or kind of rock)
Improvements, use Fence, collection box, 2 troughs; stock
Discharge 2/3 gpm cfs (M), F, R, Temperature 17 °C °F
Conductance 1350 m mhos pH
Date of record 8/14/ 1975 1976 Recorded by H. D. Goode
Remarks:
* Newly developed, not on BLM map.
Vegetation: Grass

Reference Number Bf-6 | Spring Schedule Henry Mountains Region | Name Roadside Spring
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 30aaa
Sub-drainage Buffalo, unnamed trib
County Garfield
Ident. # (Lat.) 38 00 01 (Long.) 110 50 30
Owner
Topography Creek bottom

Altitude 6900 Openings Many
Formation (or kind of rock) Colluvium over shale
Improvements, use Stock
Discharge 10 gpm cfs M, (F), R Temperature 17.5 °C °F
Conductance 1000 m mhos pH
Date of record 8/14/ 1975 1976 Recorded by H. D. Goode
Remarks:
C 8/14/75

Reference Number Bf-7 | Spring Schedule Henry Mountains Region | Name Buffalo
Quadrangle Mt Ellen
Drainage Bullfrog
Coordinates (D32-10) 30bba
Sub-drainage Buffalo Creek, unnamed trib
County Garfield
Ident. # (Lat.) 38 00 01 (Long.) 110 51 15
Owner
Topography Small gully south of Buffalo Creek, near road

Altitude 6460 Openings
Formation (or kind of rock) Colluvium
Improvements, use
Discharge 2 gpm cfs M, (F), R, Temperature 21 °C °F
Conductance 1600 m mhos pH
Date of record 8/14/ 1975 1976 Recorded by H. D. Goode
Remarks:

Reference Number Bf-8 | Spring Schedule Henry Mountains Region | Name Horn Hole
Quadrangle Mt Pennell
Drainage Bullfrog
Coordinates (D32-10) 33aba
Sub-drainage Unnamed trib
County Garfield
Ident. # (Lat.) 37 59 12 (Long.) 110 48 34
Owner
Topography Shallow valley developed on shale

Altitude 8240 Openings Two or more
Formation (or kind of rock) Shale
Improvements, use Stock
Discharge < 1* gpm cfs M, (F), R Temperature 12 °C °F
Conductance 800 m mhos pH
Date of record 8/15/ 1975 1976 Recorded by H. D. Goode
Remarks:
* Orifice west of one above yields 1+gpm, 16°, 700 mmhos.
Vegetation: Several acres of Oak.

Reference Number Bf-9 | Spring Schedule Henry Mountains Region | Name Elk Head
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D32-10)33bcd*
Sub-drainage Unnamed tributary | County Garfield
Ident. # (Lat.) 37 58 48 (Long.) 110 49 06 | Owner
Topography Junction of two tributaries on landslide slope

Altitude 7740 | Openings 2 springs
Formation (or kind of rock) Light grsy igneous rock (talus ?) over shale
Improvements, use Stock
Discharge 80 gpm cfs (M), E, R, | Temperature 8 °C °F
Conductance 390 m mhos pH
Date of record 8/15/ 1975 1976 | Recorded by H. D. Goode
Remarks:
* Coordinstes sre for upper spring. Mesured flow is combined flow of both springs.
C 8/15/75

Reference Number Bf-13 | Spring Schedule Henry Mountains Region | Name Talus Spring
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D33-10)8sds
Sub-drainage Pipe Spring Canyon, unnamed trib | County Garfield
Ident. # (Lat.) 37 57 14 (Long.) 110 49 21 | Owner
Topography South slope steep stream channel

Altitude 7840 | Openings
Formation (or kind of rock) Talus
Improvements, use Stock
Discharge 15-20 gpm cfs M, (E), R, | Temperature 10 °C °F
Conductance 320 m mhos pH
Date of record 1975 7/26/ 1976 | Recorded by H. D. Goode
Remarks:

Reference Number Bf-10 | Spring Schedule Henry Mountains Region | Name Dry Spring
Quadrangle Mt Pennell
Orainage Bullfrog | Coordinates (D33-9)12cba
Sub-drainage Bullfrog | County Garfield
Ident. # (Lat.) 37 57 03 (Long.) 110 52 24 | Owner
Topography Break in slope

Altitude 6000 | Openings
Formation (or kind of rock) Masuk sandstone over shale
Improvements, use
Oischarge gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/27/ 1976 | Recorded by H. D. Goode
Remarks:
Dsmp esrth, no flow.

Reference Number Bf-14 | Spring Schedule Henry Mountains Region | Name Bulldog Peak Spg*
Quadrangle Mt Hillers
Drainage Bullfrog | Coordinates (D33-11)19ccb
Sub-drainage Pennell Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 55 05 (Long.) 110 44 49 | Owner
Topography Gully west of Bulldog Peak

Altitude 7900 | Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/27/77 | Recorded by H. D. Goode
Remarks:
* Plotted as Mud Spg on Topo
7/4/77 Small pool, no visible flow in deep gully

Reference Number Bf-11 | Spring Schedule Henry Mountains Region | Name Pine Spring
Quadrangle Mt Pennell
Orainage Bullfrog | Coordinates (D33-10)4bcb*
Sub-drainage Pipe Spring Canyon | County Garfield
Ident. # (Lat.) 37 58 04 (Long.) 110 49 11 | Owner
Topography NW fscing colluvisl slope - may be mudflow or landslide

Altitude 8160 | Openings One principsl - st lesst 2 other seeps north of spg
Formation (or kind of rock) Colluvium over shsle
Improvements, use Stock
Oischarge 60 gpm cfs (M), E, R, | Temperature 8 °C °F
Conductance 360 m mhos pH
Date of record 7/8/ 1975 7/11/ 1976 | Recorded by H. D. Goode
Remarks:
C 7/8/75
* On BLM map spring is shown in sec 5.
7/11/76 8°C 330 mmho Beckman; 350 Hsch 40 gpm M
Vegetation: Large pondeross st spring, others below
7/4/77 9°C 355mmho 1.8gpm M

Reference Number Bf-15 | Spring Schedule Henry Mountains Region | Name Mud Spring
Quadrangle Mt Hillers
Orainage Bullfrog | Coordinates (D33-10)24ddd**
Sub-drainage Pennell Creek, unnsmed trib | County Garfield
Ident. # (Lat.) 37 54 53 (Long.) 110 44 58 | Owner
Topography Swsle southeast slope Mt Pennell

Altitude 7750 | Openings Seeps
Formation (or kind of rock) Shsle
Improvements, use Stock
Oischarge * gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos pH
Oate of record 7/9/ 1975 8/4/ 1976 | Recorded by H. D. Goode
Remarks:
* Did not measure; low flow. ** BLM map shows this spring in sec 25; USGS map lsbels s spring in sec 19 as Mud Spring.
7/4/77 Low flow

Reference Number Bf-12 | Spring Schedule Henry Mountains Region | Name Pennell Igneous
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D33-10)9bbc
Sub-drainage Pipe Spring Csnyon, unnamed trib | County Garfield
Ident. # (Lat.) 37 57 18 (Long.) 110 49 15 | Owner
Topography Very steep stream channel in igneous bedrock

Altitude 8040 | Openings
Formation (or kind of rock) Igneous (may be nesrly vertical contsct with shsle)
Improvements, use Stock
Oischarge 110 gpm cfs (M), E, R | Temperature 10 °C °F
Conductance 275 m mhos pH
Date of record 1975 7/26/ 1976 | Recorded by H. D. Goode
Remarks:
C 7/26/76

Reference Number Bf-16 | Spring Schedule Henry Mountains Region | Name Sidehill
Quadrangle Mt Pennell
Orainage Bullfrog | Coordinates (D33-10)23dsa
Sub-drainage Pennell Creek, unnsmed trib | County Garfield
Ident. # (Lat.) 37 55 13 (Long.) 110 46 06 | Owner
Topography South slope of Bulldog ridge

Altitude 8240 | Openings
Formation (or kind of rock) Colluvium, probably over igneous rock
Improvements, use Collection box, pipe, series of troughs 280 ft long
Discharge 3* gpm cfs (M), E, R | Temperature 11 °C °F
Conductance 350 m mhos pH
Oate of record 7/9/ 1975 7/10 1976 | Recorded by H. D. Goode
Remarks:
* 7/10/76 17°C 1 1/2 gpm Measured
Vegetation: Oaks

Reference Number Bf-17 | Spring Schedule Henry Mountains Region | Name Spring on Flat
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D33-10)26dbb
Sub-drainage Pennell Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 54 21 (Long.) 110 46 33 | Owner
Topography South facing side of hill at base

Altitude 7020 | Openings Seeps
Formation (or kind of rock) Mancos shale near intrusive
Improvements, use Stock
Discharge 2-3 gpm cfs M, (E), R, | Temperature 13 °C °F
Conductance 720 m mhos pH
Date of record 7/9/ 1975 1976 | Recorded by H. D. Goode
Remarks:
Could not meaaure.
Vegetation: Grasa

Reference Number Bf-18 | Spring Schedule Henry Mountains Region | Name Behnke Spring
Quadrangle Mt Hillers
Drainage Bullfrog Creek | Coordinates (D33-11)29dac
Sub-drainage Pennell Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 54 13 (Long.) 110 42 57 | Owner Richard Behnke
Topography Steep west slope Cass Creek Peak

Altitude 7960 | Openings 1
Formation (or kind of rock) Talus
Improvements, use Pipe; domestic at mining camp
Discharge 2-3 gpm cfs M, (E), R | Temperature 4 °C 39 °F
Conductance 225 m mhos pH
Date of record 8/2/ 1975 1976 | Recorded by H. D. Goode
Remarks:

Reference Number Bf-19 | Spring Schedule Henry Mountains Region | Name Pennell Spring
Quadrangle Mt Hillers
Drainage Bullfrog | Coordinates (D33-11)30dda
Sub-drainage Pennell Creek | County Garfield
Ident. # (Lat.) 37 54 13 (Long.) 110 43 50 | Owner
Topography Southside Pennell Creek

Altitude 7160 | Openings Two
Formation (or kind of rock) Colluvium
Improvements, use Stock
Discharge 25-30* gpm cfs M, (E), R, | Temperature 9 °C °F
Conductance 285 m mhos pH
Date of record 8/2/ 1975 7/9/ 1976 | Recorded by H. D. Goode
Remarks: * 7/9/76 Est 3-4 gpm
Adjacent Creek 100 ± 10 gpm M 8/2/75
10 gpm E 7/9/76
7/5/77 9°C 270mmho 4.8gpm M
In 1977 another orifice was discovered about 100 ft north of orifice near road. This orifice might have supplied most of streamflow estimated in 1976.
7/5/77 9°C 260mmho 9.4gpm M (north orifice)

Reference Number Bf-20 | Spring Schedule Henry Mountains Region | Name Sackett Spring
Quadrangle Mt Hillers
Drainage Bullfrog Creek | Coordinates (D33-11)31abb
Sub-drainage Pennell Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 53 59 (Long.) 110 44 18 | Owner
Topography Gentle slope

Altitude 7020 | Openings
Formation (or kind of rock) Colluvium
Improvements, use
Discharge 15-20 gpm cfs M, (E), R | Temperature 11 °C °F
Conductance 650 m mhos pH
Date of record 8/2/ 1975 1976 | Recorded by H. D. Goode
Remarks:
7/4/77 11°C 660mmhos 15-20gpm E.
This spring appears little changed from what it was in 1975.

Reference Number Bf-21 | Spring Schedule Henry Mountains Region | Name Caas Reaevoir
Quadrangle Mt Hillers
Drainage Bullfrog Creek | Coordinates (D33-11)32bcd
Sub-drainage Pennell Creek, unnamed trib | County Garfield
Ident. # (Lat.) 37 53 39 (Long.) 110 43 32 | Owner
Topography Steep west slope Mt Hillers

Altitude 7400 | Openings 1
Formation (or kind of rock) Igneous over shale
Improvements, use Stock, flows to reservoir
Discharge 60-65 gpm cfs (M), E, R, | Temperature 8 °C °F
Conductance 320 m mhos pH
Date of record 8/2/ 1975 7/9/ 1976 | Recorded by H. D. Goode
Remarks:
C 8/2/75
8/2/75 Flow measured at road, temperature measured at spring opening.
7/9/76 20°C 320 mmho 48 gpm measured at road.
Vegetation: Aspen
7/5/77 22°C 305mmho 20gpm M at road

Reference Number Bf-22 | Spring Schedule Henry Mountains Region | Name Emery Seep
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D33-9)15cba
Sub-drainage Muley Creek | County Garfield
Ident. # (Lat.) 37 56 10 (Long.) 110 54 33 | Owner
Topography Deep alcove in sandstone

Altitude 5600 | Openings
Formation (or kind of rock) Emery Sandstone
Improvements, use
Discharge 1-2 gpm cfs M, (E), R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/28/1976 | Recorded by H. D. Goode
Remarks:
Inaccessible

Reference Number Bf-23 | Spring Schedule Henry Mountains Region | Name Footbath Spg
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D33-9)17ccd
Sub-drainage Muley Creek | County Garfield
Ident. # (Lat.) 37 55 50 (Long.) 110 56 50 | Owner
Topography Alcove

Altitude 5520 | Openings
Formation (or kind of rock) Sandstone, Emery
Improvements, use Stock
Discharge 2 gpm cfs M, (E), R, | Temperature 25 °C °F
Conductance 1300 m mhos pH
Date of record 1975 7/28/ 1976 | Recorded by H. D. Goode
Remarks:

Reference Number Bf-24 | Spring Schedule Henry Mountains Region | Name Muley X
Quadrangle Mt Pennell
Drainage Bullfrog | Coordinates (D33-9)17ccc
Sub-drainage Muley Creek | County Garfield
Ident. # (Lat.) 37 55 48 (Long.) 110 56 59 | Owner
Topography Break in sandstone ledge

Altitude 5480 | Openings
Formation (or kind of rock) Sandstone, Emery
Improvements, use
Discharge < 1/4 gpm cfs M, (E), R | Temperature 20 °C °F
Conductance 1800 m mhos pH
Date of record 1975 7/28/ 1976 | Recorded by H. D. Goode
Remarks:

Reference Number Bf-25 — Spring Schedule Henry Mountains Region — Name Muley Z
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D33-9)20bba
Sub-drainage Muley Creek — County Garfield
Ident. # (Lat.) 37 55 41 (Long.) 110 56 43 — Owner
Topography Broad swale filled with grass and oak
Altitude 5500 — Openings
Formation (or kind of rock) Emery Sandstone
Improvements, use
Discharge < 1/8 gpm cfs M, (E), R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/28/ 1976 Recorded by H. D. Goode
Remarks:
Vegetation: Oak tall grass

Reference Number Bf-26 — Spring Schedule Henry Mountains Region — Name Muley W
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D33-9)20bbb
Sub-drainage Muley Creek — County Garfield
Ident. # (Lat.) 37 55 40 (Long.) 110 56 52 — Owner
Topography Side of alcove, below waterfall
Altitude 5440 — Openings
Formation (or kind of rock) Grey sandstone, Emery
Improvements, use
Discharge * gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/28/ 1976 Recorded by H. D. Goode
Remarks:
Inaccessible
* Visual estimate from a distance of several gpm.

Reference Number Bf-27 nv — Spring Schedule Henry Mountains Region — Name Muley V
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D33-9)19dab
Sub-drainage Muley Creek, unnamed left fork — County Garfield
Ident. # (Lat.) 37 55 14 (Long.) 110 57 11 — Owner
Topography Alcove
Altitude 5420 — Openings
Formation (or kind of rock) Emery sandstone
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 1975 7/28/ 1976 Recorded by H. D. Goode
Remarks:
In deep alcove - Saw only from airplane.

Reference Number Bf-28 nv — Spring Schedule Henry Mountains Region — Name Muley Seeps
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D34-9)22add
Sub-drainage Muley Creek — County Garfield
Ident. # (Lat.) 37 50 17 (Long.) 110 53 45 — Owner
Topography Broad Creek Valley
Altitude 4780 — Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 2/27/77 Recorded by H. D. Goode
Remarks:
Did not visit. No evidence of water on air photos.

Reference Number Bf-29 — Spring Schedule Henry Mountains Region — Name Buck Spring
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D35-10)7cbb
Sub-drainage Muley Creek, Butt Canyon — County Garfield
Ident. # (Lat.) 37 46 41 (Long.) 110 51 27 — Owner
Topography Canyon in sandstone, creek bottom
Altitude 4490 — Openings
Formation (or kind of rock) Alcove in Dakota Sandstone, overlying clay
Improvements, use
Discharge < 1 gpm cfs M, (E), R, Temperature 17 °C °F
Conductance 2500 m mhos pH
Date of record 8/19/1975 1976 Recorded by H. D. Goode
Remarks:

Reference Number Bf-30 — Spring Schedule Henry Mountains Region — Name Jackass Spring
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D35-9)13bbd
Sub-drainage Unnamed trib — County Garfield
Ident. # (Lat.) 37 46 09 (Long.) 110 52 20 — Owner
Topography Stripped sandstone surface
Altitude 4790 — Openings
Formation (or kind of rock) Dakota sandstone
Improvements, use Trough; stock
Discharge < 1/16 gpm cfs M, (E), R Temperature 20 °C °F
Conductance 620 m mhos pH
Date of record 8/19/ 1975 1976 Recorded by H. D. Goode
Remarks:

Reference Number Bf-31 — Spring Schedule Henry Mountains Region — Name Thompson Seep
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D35-9)13cbc
Sub-drainage Unnamed trib — County Garfield
Ident. # (Lat.) 37 45 47 (Long.) 110 52 34 — Owner
Topography Shallow alcove
Altitude 4920 — Openings
Formation (or kind of rock) X bedded Dakota sandstone above clay
Improvements, use Collection drum; storage tank, trough; stock
Discharge < 1 gpm cfs M, (E), R, Temperature 21 °C °F
Conductance 850 m mhos pH
Date of record 8/19/ 1975 1976 Recorded by H. D. Goode
Remarks:
Indian storage cave above spring.
Vegetation: Cottonwood

Reference Number Bf-32 — Spring Schedule Henry Mountains Region — Name Egg Nog
Quadrangle Mt Pennell
Drainage Bullfrog — Coordinates (D35-10)18bad
Sub-drainage Unnamed trib — County Garfield
Ident. # (Lat.) 37 46 10 (Long.) 110 51 01 — Owner
Topography
Altitude 4480 — Openings
Formation (or kind of rock) Dakota sandstone over shale
Improvements, use
Discharge 2-3 gpm cfs M, (E), R Temperature 15 °C °F
Conductance 700 m mhos pH
Date of record 8/19/1975 1976 Recorded by H. D. Goode
Remarks:
C 8/19/75
Vegetation: Cottonwood, willows, salt cedar

Reference Number Bf-33 | Spring Schedule Henry Mountains Region | Name Indian Spring
Quadrangle Mt Hillers
Drainage Bullfrog
Coordinates (D34-11)7dbc
Sub-drainage Saleratus Wash
County Garfield
Ident. # (Lat.) 37 51 48 (Long.) 110 44 19
Owner
Topography Pediment slope
Altitude 6430 Openings
Formation (or kind of rock) Sand, probably over Tununk Shale
Improvements, use Fenced collection box; stock
Discharge 1/4 gpm cfs M, (E), R, Temperature 17 °C °F
Conductance 470 m mhos pH
Date of record 8/2/ 1975 1976 Recorded by H. D. Goode
Remarks:
Several springs in area. 30 ft diameter pond below one of these, is fed by seep that yields 2 gpm 400 mmhos 17°C.

7/5/77 New metal collection box north of old one
19°C 390mmho <1qt/min E

Reference Number Bf-34 | Spring Schedule Henry Mountains Region | Name Cow Seeps
Quadrangle Mt Pennell
Drainage Bullfrog
Coordinates (D34-10)24bca
Sub-drainage Saleratus Wash
County Garfield
Ident. # (Lat.) 37 50 23 (Long.) 110 45 50
Owner
Topography Gully cut into edge of pediment
Altitude 5440 Openings
Formation (or kind of rock) Pediment gravel
Improvements, use Trough; stock
Discharge 1* gpm cfs (M), E, R Temperature 17 °C °F
Conductance 620 m mhos pH
Date of record 8/3/ 1975 1976 Recorded by H. D. Goode
Remarks:
* Discharge measured at pipe, no flow at spring.
7/5/77 19°C 610 mmho 5qt/min M

Reference Number Bf-35 | Spring Schedule Henry Mountains Region | Name Saleratus Spring
Quadrangle Mt Pennell
Drainage Bullfrog
Coordinates (D35-10)21bcc
Sub-drainage Saleratus Wash
County Carfield
Ident. # (Lat.) 37 45 07 (Long.) 110 49 16
Owner
Topography
Altitude 4390 Openings
Formation (or kind of rock) Dakota sandstone caprock over shale
Improvements, use
Discharge < 1 gpm cfs M, (E), R, Temperature 20 °C °F
Conductance 1700 m mhos pH
Date of record 8/19/ 1975 1976 Recorded by H. D. Goode
Remarks:
Vegetation: Wire grass

Reference Number Bf-36 | Spring Schedule Henry Mountains Region | Name Salt Spring
Quadrangle Mt Pennell
Drainage Bullfrog
Coordinates (D35-10)20aac*
Sub-drainage Saleratus Wash, unnamed trib
County Carfield
Ident. # (Lat.) 37 45 16 (Long.) 110 49 31
Owner
Topography
Altitude 4390 Openings
Formation (or kind of rock) Dakota sandstone
Improvements, use
Discharge < 1/4 gpm cfs M, (E), R Temperature 20 °C °F
Conductance 4600 m mhos pH
Date of record 8/19/ 1975 1976 Recorded by H. D. Goode
Remarks:
* Spring is in small alcove south of road; BLM map shows it north of road.

Reference Number Bf-37 | Spring Schedule Henry Mountains Region | Name Fourmile
Quadrangle Hall Mesa
Drainage Bullfrog
Coordinates (D35-10)33dbc
Sub-drainage Fourmile Canyon
County Garfield
Ident. # (Lat.) 37 43 05 (Long.) 110 48 42
Owner
Topography Stream channel cut into flat lying Morrison Sandstone
Altitude 4320 Openings One principal*
Formation (or kind of rock) Morrison
Improvements, use Goes downstream; stock
Discharge 1 gpm cfs M, (E), R, Temperature 19 °C °F
Conductance 1300 Beck m mhos pH
Date of record 1975 8/31/ 1976 Recorded by H. D. Goode
Remarks:
C 8/31/76
Vegetation: Cottonwood, wire grass
* One principal, plus seepage - water issues from crack in sandstone in stream channel.

Reference Number Bf-38 | Spring Schedule Henry Mountains Region | Name Clay Seep
Quadrangle Hall Mesa
Drainage Bullfrog
Coordinates (D35-9)26bbb
Sub-drainage Clay Canyon, unnamed trib
County Garfield
Ident. # (Lat.) 37 44 32 (Long.) 110 53 35
Owner
Topography Shallow valley in sandstone
Altitude 5000 Openings
Formation (or kind of rock) Morrison
Improvements, use Six troughs, all full; stock
Discharge < 1/8* gpm cfs (M), E, R Temperature 21 °C °F
Conductance 710 m mhos pH
Date of record 8/19/1975 1976 Recorded by H. D. Goode
Remarks:
* Could not find source; measured at pipe.
C 4/26/59

Reference Number Bf-39 | Spring Schedule Henry Mountains Region | Name Point Seep
Quadrangle Hall Mesa
Drainage Bullfrog
Coordinates (D36-10)26add
Sub-drainage Unnamed trib
County Carfield
Ident. # (Lat.) (Long.)
Owner
Topography Edge of mesa
Altitude 4900 Openings
Formation (or kind of rock) Morrison Formation
Improvements, use
Discharge gpm cfs M, E, R, Temperature °C °F
Conductance m mhos pH
Date of record 8/4/ 1975 1976 Recorded by H. D. Goode
Remarks:
Could not find seep.

Reference Number LC-1 | Spring Schedule Henry Mountains Region | Name Dove Spring

Drainage Long Canyon | Quadrangle Hall Mesa

Sub-drainage | Coordinates (D36-9)10acc

Ident. # (Lat.) 37 41 35 (Long.) 110 54 28 | County Garfield

Topography Small alcove in caprock of Mesa | Owner

Altitude 4960 | Openings

Formation (or kind of rock) Dakota sandstone over shale

Improvements, use Collection box, overturned tank

Discharge no flow gpm ____ cfs M, E, R, | Temperature 19 °C ____ °F

Conductance 2800 m mhos ____ pH

Date of record 8/19/ 1975 ____ 1976 ____ | Recorded by H. D. Goode

Remarks:

C 8/19/75

Reference Number LC-2 | Spring Schedule Henry Mountains Region | Name Berts Spring

Drainage Long Canyon | Quadrangle Hall Mesa

Sub-drainage Unnamed trib | Coordinates (D36-9)10dcb

Ident. # (Lat.) 37 41 14 (Long.) 110 54 28 | County Garfield

Topography Broad alcove in sandstone below mesa top | Owner

Altitude 4940 | Openings

Formation (or kind of rock) Dakota over shale

Improvements, use Tank and trough; stock

Discharge < 1/4 gpm ____ cfs M, (E) R | Temperature 25 °C ____ °F

Conductance 975 m mhos ____ pH

Date of record 8/19/ 1975 ____ 1976 ____ | Recorded by H. D. Goode

Remarks:

C 8/19/75

Water for chemical analysis taken from storage tank.

Reference Number LC-3 nv | Spring Schedule Henry Mountains Region | Name Halls Seep

Drainage Unnamed * | Quadrangle Hall Mesa

Sub-drainage | Coordinates (D37-10)17dbd

Ident. # (Lat.) 37 35 19 (Long.) 110 49 55 | County Garfield

Topography | Owner

Altitude ____ | Openings

Formation (or kind of rock)

Improvements, use

Discharge ____ gpm ____ cfs M, E, R, | Temperature ____ °C ____ °F

Conductance ____ m mhos ____ pH

Date of record ____ 1975 ____ 1976 ____ | Recorded by

Remarks:

* The seep is on an unnamed tributary to Bullfrog Basin below Long Canyon.

Shows on BLM map. Did not visit, too remote.

Reference Number H1-1 | Spring Schedule Henry Mountains Region | Name Bitter Spring
Quadrangle Wagon Box
Drainage Halls Creek | Coordinates (D33-8)27bbb
Sub-drainage Bitter Spring Creek | County Garfield
Ident. # (Lat.) 37 54 58 (Long.) 111 01 19 | Owner
Topography Steep canyon in flat-lying rocks

Altitude 5280 | Openings 3 in separate horizons
Formation (or kind of rock) Sandstone over shale Emery
Improvements, use
Discharge 10 gpm cfs M, (E), R, | Temperature 14* °C °F
Conductance 910* m mhos pH
Date of record 8/21/1975 1976 | Recorded by H. D. Coode
Remarks:
C 8/21/75
* Temperature is the lowest of three orifices and conductance is the downstream composite of the three water bearing horizons.

Reference Number H1-2 | Spring Schedule Henry Mountains Region | Name Bitter Creek Spg
Quadrangle Wagon Box
Drainage Halls Creek | Coordinates (D33-8)26bbb
Sub-drainage Bitter Creek | County Garfield
Ident. # (Lat.) 37 54 55 (Long.) 111 00 09 | Owner
Topography Broad valley with 20 ft of alluvium above present flood plain

Altitude 5290 | Openings
Formation (or kind of rock) Creek bottom, probably from Emery Sandstone
Improvements, use
Discharge gpm cfs M, E, R | Temperature 25 °C °F
Conductance 2200 m mhos pH
Date of record 8/21/1975 1976 | Recorded by H. D. Goode
Remarks:
Coal bed is about 100 ft above creek.

Reference Number H1-3 nv | Spring Schedule Henry Mountains Region | Name Swap Canyon Spg
Quadrangle Mt Pennell
Drainage Halls Creek | Coordinates (D33-9)31bbb
Sub-drainage Swap | County Carfield
Ident. # (Lat.) (Long.) | Owner
Topography

Altitude 5440 | Openings
Formation (or kind of rock)
Improvements, use
Discharge gpm cfs M, E, R, | Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/6/1977 | Recorded by H. D. Goode
Remarks:
Shown on BLM map; no evidence on air photos. Did not visit.

Reference Number H1-4 | Spring Schedule Henry Mountains Region | Name Swap C
Quadrangle Mt Pennell
Drainage Halls Creek | Coordinates (D33-8)25cdd
Sub-drainage Swap Canyon | County Garfield
Ident. # (Lat.) 37 54 12 (Long.) 110 58 42 | Owner
Topography Wide part of valley, rises from sandstone about 5 ft below 2 1/2 ft coal bed.

Altitude 5370 | Openings
Formation (or kind of rock) Emery Sandstone
Improvements, use
Discharge 0 gpm cfs M, E, R | Temperature 26 °C °F
Conductance 1900 m mhos pH
Date of record 8/20/1975 1976 | Recorded by H. D. Goode
Remarks:
Stagnant water; Cottonwoods, bullrushes

Reference Number H1-5 | Spring Schedule Henry Mountains Region | Name Swap A
Quadrangle Mt Pennell
Drainage Halls Creek | Coordinates (D33-8)25dcd
Sub-drainage Swap Canyon | County Garfield
Ident. # (Lat.) 37 54 09 (Long.) 110 58 28 | Owner
Topography Small alcove in canyon wall

Altitude 5360 | Openings
Formation (or kind of rock) Sandstone over shale in Emery
Improvements, use Stock
Discharge 1/8 gpm cfs M, (E), R, | Temperature 23 °C °F
Conductance 1500 m mhos pH
Date of record 8/20/1975 1976 | Recorded by H. D. Goode
Remarks:
Water from same horizon in several places along canyon walls.

Reference Number H1-6 nv | Spring Schedule Henry Mountains Region | Name Swap D
Quadrangle Mt Pennell
Drainage Halls Creek | Coordinates (D33-8)25ddb
Sub-drainage Swap, unnamed trib | County Carfield
Ident. # (Lat.) 37 54 18 (Long.) 110 58 17 | Owner
Topography Bottom of canyon

Altitude 5370 | Openings
Formation (or kind of rock) Emery
Improvements, use
Discharge gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 3/6/1977 | Recorded by H. D. Coode
Remarks:
Shown on BLM map; visible on air photos. Did not visit.

Reference Number H1-7 | Spring Schedule Henry Mountains Region | Name Swap 66
Quadrangle Mt Pennell
Drainage Halls Creek | Coordinates (D33-8)36aca
Sub-drainage Swap Canyon | County Carfield
Ident. # (Lat.) 37 53 55 (Long.) 110 58 25 | Owner
Topography Channel bottom

Altitude 5320 | Openings
Formation (or kind of rock) Sandstone over Shale Emergy
Improvements, use
Discharge gpm cfs M, E, R, | Temperature 23 °C °F
Conductance 8000+ m mhos pH
Date of record 8/20/1975 1976 | Recorded by H. D. Coode
Remarks:
C 8/20/75
Sample collected at 37 53 42; 110 58 18 about 1/4 mile below spring. Little flow but lots of salty effluent.
Vegetation: Wiregrass, salt cedar

Reference Number H1-8 nv | Spring Schedule Henry Mountains Region | Name Coal Seep
Quadrangle Mt Pennell
Drainage Halls Creek | Coordinates (D34-8)12bbd
Sub-drainage Swap, unnamed trib | County Carfield
Ident. # (Lat.) (Long.) | Owner
Topography Bench in valley above deep alcove

Altitude 5420 | Openings
Formation (or kind of rock) Emery
Improvements, use
Discharge gpm cfs M, E, R | Temperature °C °F
Conductance m mhos pH
Date of record 1975 1976 8/6/1977 | Recorded by H. D. Goode
Remarks:
Shows on BLM map; partly confirmed on air photos.
Did not visit.

APPENDIX B

Discharge estimates (E) or measurements (M) on selected streams in the Henry Mountains area, 1975-1977.

Discharge of many streams in the Henry Mountains area was estimated visually or measured with tarp, bucket, and stopwatch as described in Methods of Work. At the same time water temperatures and conductance were measured at most sites. These records are listed for the principal drainages clockwise around the Henry Mountains but they begin with Oak Creek and Pleasant Creek which originate off Boulder Mountain to the west. Individual sites are listed in upstream to downstream order beginning with the sites on the tributary farthest from the mouth.

No definite pattern is evident in comparing measurements made in 1976 with those made in 1975, but when selected sites were revisited in the first week of July 1977, it became clear that the low snowfall of the previous winter had resulted in the drying up of most of these spring-fed streams. Bull Creek which had supplied 600 or more gallons a minute in 1976 was down to 65 gallons a minute at Fairview Ranch and had no flow at several intermediate spots upstream from the ranch (the flow at the ranch was evidently underflow that was forced to the surface by subjacent bedrock). Similarly, Dugout Creek had yielded 600 to 750 gpm in its upper reaches in 1975 and 1976 but was down to an estimated 5 gpm in 1977.

TABLE 7. - DISCHARGE ESTIMATES (E) AND MEASUREMENTS (M) ON SELECTED STREAMS IN HENRY MOUNTAINS AREA, 1975-1977. MAIN DRAINAGES ARE LISTED IN CLOCKWISE ORDER AROUND MOUNTAINS; INDIVIDUAL SITES ARE LISTED IN UPSTREAM-TO-DOWNSTREAM ORDER. SITES AND SOME DISCHARGES ARE ALSO SHOWN ON FIGURE 6. CHEM = CHEMICAL ANALYSIS GIVEN IN TABLE 5.

Drainage	Sub-drainage	Coordinates	Latitude	Longitude	Altitude	Date	Flow	°C Temp.	Conductance mmho	Remarks
FREMONT	Pleasant Crk (upper)	(030-7)29aba	38 10 47	111 10 49	5910	8/23/75	8-10cfs E	23.5	235	Chem
	Pleasant Crk (lower)	(029-7)25bcc	38 15 29	111 07 09	5030	6/29/75	300-400gpm E			
						8/23/75	1½-2cfs E	26	1200	Chem
	Oak Creek (Notom Road)	(031-8)19abc	38 05 59	111 04 03	5250	6/29/75	4-5cfs E			
	Oak Creek (Siphon)	(031-7)27cbb	38 04 49	111 07 52	5800	8/22/75	5cfs M			Measured diversion, not creek
SWEETWATER	South Creek	(032-9)1bdc	38 03 11	110 52 15	7120	7/16/76	330gpm M	27	410	Measured at road
						7/4/77	no flow			No evidence of recent flow
	Ougout Creek	(031-10)29ddd	38 04 26	110 49 22	8880	7/29/75	250gpm E	9		Chem
						7/4/77	no flow			Possibly 2-3 gpm underflow
		(031-10)29cba	38 04 52	110 50 11	8220	7/30/75	750gpm M	16	350	2+ hrs of rain, 6 PM 7/29/75
						7/16/76	600gpm M	15		
						7/4/77	5gpm E	13	440	
		(031-9)24cbc	38 05 36	110 52 29	6880	7/17/76	2cfs E	20	420	Near canyon mouth
	Diversion ditch to King Ranch	(031-9)26abb	38 05 18	110 53 07	6640	7/17/76	1½-2 cfs E			50gpm± to creek
		(031-9)27cdd	38 04 29	110 54 15	6380	7/17/76	1cfs E			
	Ougout Creek	(031-9)21cbd	38 05 38	110 55 36	6030	8/4/76	1½cfs E			Flow not diverted to King Ranch - washout
		(031-9)18aca	38 06 46	110 57 19	5660	7/31/75	150-200gpm E	28	1100	
		(031-9)7ccb	38 07 12	110 57 59	5500	8/4/76	1½cfs E	26	630	Near coal mine; flow not diverted to King Ranch
	Ougout-unnamed trib	(031-10)33aba	38 04 26	110 48 37	9540	7/29/75	130gpm E	15	320	
	Ougout-North(No) Fork Pistol Creek	(031-10)20bbc	38 06 02	110 50 19	8600	7/30/75	50gpm M	17	380	2:45 PM
						7/17/76	28gpm M	10	410	8:15 AM
						7/4/77	0amp, no flow			7:50 AM
	Ougout-South Fork Pistol Creek	(031-10)20cbc	38 05 38	110 50 20	8360	7/30/75	65gpm M	19.5	290	1:00 PM
						7/17/76	35gpm M	14	350	9:35 AM
						7/4/77	4gpm M	15	440	8:35 AM
	Cedar Creek	(031-10)17bbb	38 07 00	110 50 18	8800	7/30/76	43gpm M	7	235	
		(031-10)18aba	38 07 02	110 50 48	8460	7/30/76	50gpm E	8	310	
		(031-10)7cdc	38 07 07	110 51 12	8080	7/30/76	150gpm M	14	350	
		(031-9)12bbc	38 07 42	110 52 29	7050	7/30/76	100-120 gpm E	26	325	Chem. Flow disappeared about 200 yds below this point
	Oak Creek (Headwaters of Oak Creek mislabeled as Cottonwood Crk on Mt. Ellen quad and BLM map)	(030-10)33ccb	38 09 19	110 50 29	7200	7/26/75	300-400gpm E	12		
		(030-10)32dad	38 09 21	110 50 39	7100	7/26/75	250gpm E	15	450	
		(030-10)32dad	38 09 24	110 50 44	7050	7/26/75	15gpm E	16.5	360	
		(030-10)32dab	38 09 29	110 50 47	7000	7/26/75	120gpm M	10.5	630	
		(030-10)20cba	38 11 21	110 51 34	5700	7/27/75	2cfs E	11.5	550	Chem
						7/3/77	27gpm M	15	690	
	Mainstream	(031-8)24caa	38 05 43	110 58 41	5480	8/22/75	10gpm E	25	3800	Above Spring Sw17
							14gpm E	25	3300	Below Spring Sw17
	Mainstream (Channel Site 12)	(030-9)30cac	38 10 12	110 59 07	5100	8/6/77	2cfs E			
	Mainstream (Channel Site 14)	(029-9)2acb	38 19 08	110 54 24	4530	8/28/76	no flow			
BIRCH	Mainstream	(030-10)27adc	38 10 30	110 48 40	6650	7/11/75	75gpm M	18	385	Chem
						7/27/75	100gpm M	14.5	410	
						8/2/76	130gpm M	16.5	390	
						8/28/76	160gpm M	10.5	420	
						7/2/77	86gpm M	21	380	
		(030-10)23ccc	28 10 52	110 48 23	6380	8/2/76	60gpm E	22	330	Chem
						7/2/77	40gpm E	27.5	335	
		(030-10)23caa	38 11 16	110 47 59	6100	8/2/76	40gpm E	25	300	
						7/2/77	no flow			
		(030-10)23abb	38 11 40	110 47 49	5880	8/2/76	24gpm M	27	285	Chem. Flow disappeared about 200 yds below this point.
BULL	Mainstream at Lonesome Beaver	(031-10)14acb	38 06 44	110 46 33	8800	7/29/75		9	410	Chem. Sampled at campground faucet
						7/13/76	600gpm M	10.5	330	
						7/3/77	37gpm M	6	490	
	Mainstream at Fairview Diversion	(030-11)18dab	38 11 57	110 45 08	5380	7/28/75	3cfs E	18	480	Chem. Sampled from diversion ditch
						7/2/77	70gpm E	16.5	750	
	Fairview Diversion Ditch	(030-11)17bab	38 12 25	110 44 37	5300	8/3/76	1.4cfs M	23	480	Chem
						7/2/77	65 gpm M	19	710	
GRANITE	Mainstream	(031-10)26abb	38 05 18	110 46 32	8960	7/29/75	210gpm M	7	220	Chem
						7/13/76	100-120gpm E			
						7/3/77	Dry, no flow			
DRY VALLEY WASH	Mainstream	(029-11)16aaa	38 17 37	110 42 51	4610	7/11/75	6-7cfs E			Flood water. Channel normally dry
						7/3/77	no flow			
	Cow Creek	(030-11)5dbc	38 13 32	110 44 19	5080	8/1/76	200-300gpm E	25	620	
		(029-11)33bba	38 14 58	110 43 29		8/3/76	100gpm E	20	1650	
						7/2/77	Both above sites were dry			
NORTH WASH	Copper Creek	(032-10)2aaa	38 03 34	110 46 02	8620	7/10/75	30gpm M	7	435	
						7/11/76	7-8gpm E			
						7/13/76	10gpm E			After rain
	Crescent Creek	(031-10)36bab	38 04 23	110 45 38	8260	7/11/76	>100gpm E			
TRACHYTE	Black (Dark) Canyon	(032-10)26aca	37 59 51	110 46 21	7420	7/9/75	600gpm E			Could not measure flow
						8/15/75	5gpm E	10	250	Flow 40-50gpm 150 yds upstream
						7/11/76	120-150gpm E			
						7/4/77	No flow, dry			One-half inch of rain fell in this drainage an hour before this observation
	Straight Creek	(033-10)12caa	37 56 58	110 45 32	7780	7/9/75	150gpm M			
						7/11/76	130gpm M	11	220	
						7/4/77	Dry, no flow			No evidence of recent flow
	Slate Creek	(032-10)3dbb	38 03 04	110 47 34	9240	7/16/76	30gpm E	9	280	Upper road
		(032-10)10aca	38 02 26	110 47 30	8520	7/10/75	200gpm E	9	380	Lower road
						7/11/76	40-50gpm E			
						7/13/76	40-50gpm E			During heavy rain
						7/16/76	30gpm E	10	410	
						7/4/77	3-4gpm E	9	460	Light rain
BULLFROG	Buck	(032-10)16aaa	38 01 49	110 48 16	8120	7/15/76	5gpm M	19	570	
						7/4/77	No flow			No evidence of recent flow
	North Fork Bullfrog	(032-10)9ccb	38 01 59	110 49 10	8070	7/15/76	16gpm M	20	700	2:50 PM
						7/16/76	17gpm M	18	720	12:00 Noon
						7/4/77	No flow			No evidence of recent flow
		(032-10)30bbc	37 59 57	110 51 24	6420	8/14/75	40gpm E	25	1700	
						7/15/76	40-50gpm E	14	1690	
	Pennell	(033-11)30dda	37 54 13	110 43 13	7160	8/2/75	100gpm E	11	350	
						7/9/76	10gpm E			
						7/5/77	9.4gpm M	9	250	All flow from north orifice Pennell Spring - 8f-19
	Pipe Spring Creek	(033-9)13bcb	37 56 22	110 52 31	5840	7/27/76	300gpm M	22	600	
	Mainstream	(033-9)14ada	37 56 21	110 52 42	5820	7/27/76	600gpm M			
	Scratch Canyon Creek	(033-9)25abb	37 54 53	110 51 55	5480	7/27/76	20-30gpm E			Visual estimate with binoculars
	Mainstream Site 6	(035-10)7daa	37 46 41	110 50 28	4440	7/25/76	50gpm E			
	Mainstream	(035-10)7ddb	37 46 27	110 50 38	4430	8/19/75	200gpm E	22	2200	
						8/31/76	250-300gpm E	23.5	2500	

APPENDIX C

Test drilling by AMAX Coal Company, by Conservation Division, U.S. Geological Survey, and for uranium exploration.

In recent years several organizations have done appreciable test drilling for different purposes. The results of this drilling have not been interpreted in detail, but we note the events here as a guide to further interpretation by others.

In December 1972 and January 1973, AMAX Coal Company drilled 42 test holes, most of them 150 to 200 feet deep, with a couple more than 300 feet deep. The general locations of the test holes and the specific locations of nine holes that showed water are given below:

General Area	Township	Total holes	Water reported
Wildcat Mesa	T.31 S., R.8 E.	23	6
King Ranch	T.32 S., R.9 E.	4	1
Swap Mesa	T.33 S., Rs. 8&9 E.	7	2
Cave Flat	T.33 S., R.10 E.	8	0

Water Holes Hole #	Location	Total depth	Fluid level
105	T.31 S., R.8 E., NE NE NE Sec. 26	220	146
106	T.31 S., R.8 E., NE NE SW Sec. 22	280	233
112	T.31 S., R.8 E., SW NE SE Sec. 10	180	168
115	T.31 S., R.8 E., NW NW SW Sec. 14	180	149
201	T.31 S., R.8 E., NE SE SE Sec. 22	210	190
202	T.31 S., R.8 E., NE NW NW Sec. 26	240	171
102	T.32 S., R.9 E., NW SE SW Sec. 5	280	130
220	T.33 S., R.8 E., SE NE SE Sec. 26	220	156
225	T.33 S., R.8 E., NE SE NW Sec. 24	225	120

In 1976, the Conservation Division, U.S. Geological Survey, contracted for the drilling of 8 test holes north of the Fremont River in T.27 and 28S., R.9E., and 19 holes south of the Fremont: One in T.29S., R.10E; two in T.30S., R.10E.; two in T.31S., R.8E.; five in T.31S., R.9E.; one in T.32S., R.8E.; six in T.32S., T.9E.; and two in T.33S., R.8E. Resistivity and gamma-ray logs of these holes have been placed in the open file in the offices of the U.S. Geological Survey, Federal Center, Denver, Colorado, 80225.

In July 1977 five or six drilling rigs were in operation on the flats at the head of Shitamaring Canyon, principally in T.35S., R.11E. These rigs were evidently exploring for uranium. When or if the results of this drilling will become available is unknown.

APPENDIX D

Cross-channel profiles on selected streams that drain the coal basin

During the summer of 1976 sixteen sites were located on channels of streams that drain northward and southward from the coal basin (locations of sites are plotted on figure 5); the sites were selected to provide benchmark data about the natural channels as they existed at the time of examination, prior to proposed development of coal in the area. At each site:

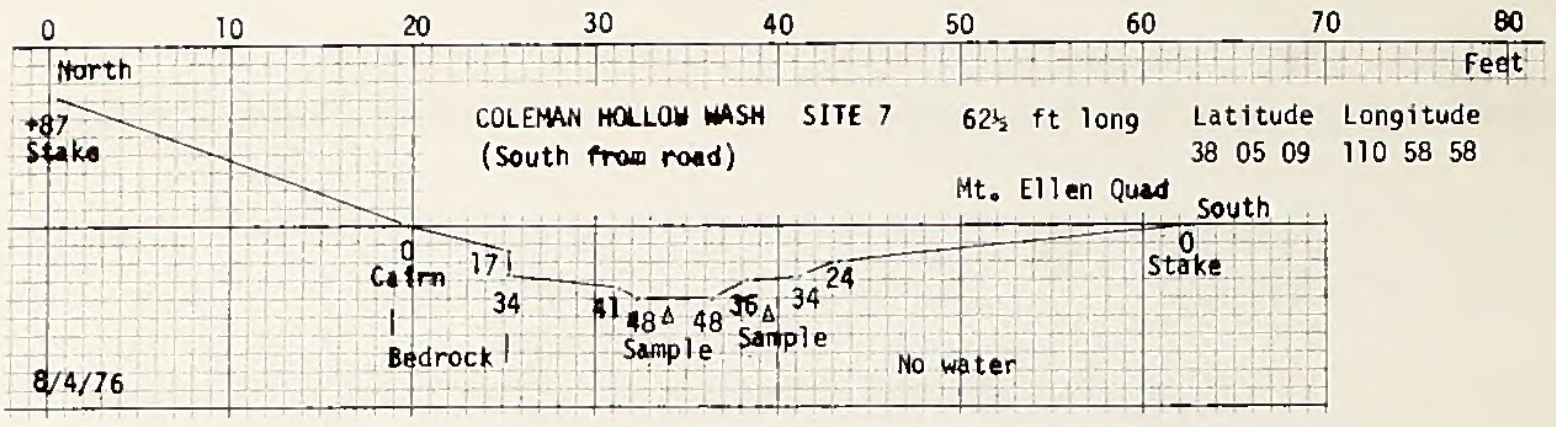
1) The location was plotted on the appropriate 15-minute quadrangle map - these maps are on file with the U.S. Geological Survey and are not reproduced here. The latitude and longitude of each site is given here on the profiles in figures 7A and 7B,

2) The channel was surveyed with tapes and brunton - the profiles that resulted from the survey are shown in figures 7A and 7B,

3) Two or three grab samples of the channel sediments were collected for use of the Geological Survey. The collection points are noted on the profiles,

4) Photographs of the sites were taken generally while tape and sample boxes were in place. Those photographs are on file with the Geological Survey.

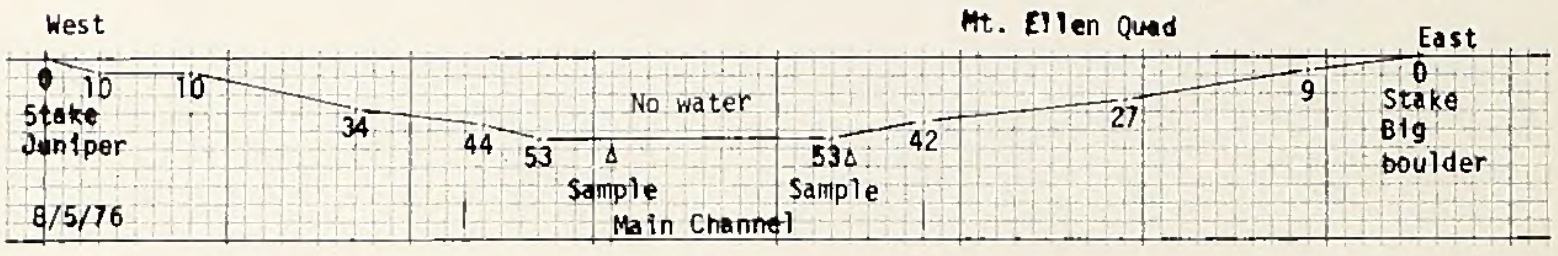
If the coal in Coal Bed Mesa, Tarantula Mesa, or Wildcat Mesa is developed in the next several years, the effect of that development on the channel profiles and sediments at these sites may be evaluated by re-surveying and re-sampling.



SEVEN CANYON SITE 8

75 ft

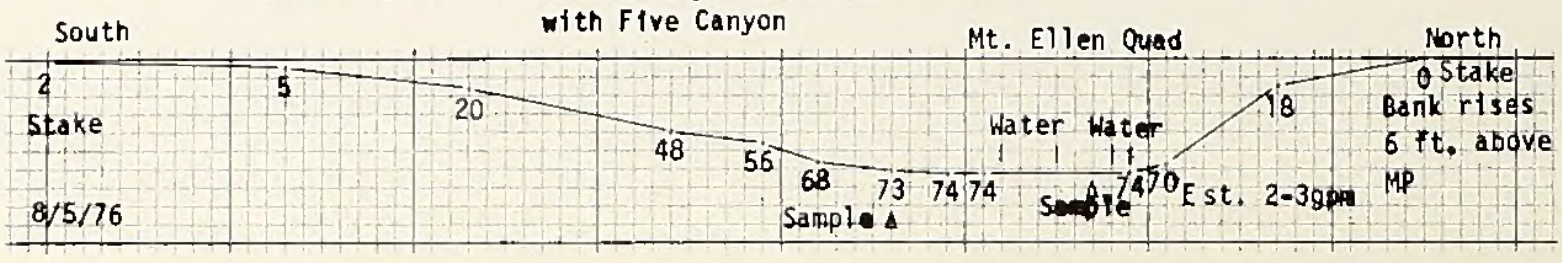
38 01 48 110 56 05



SEVEN CANYON SITE 9
(Below King Ranch) about 200 yds above confluence with Five Canyon

75 ft

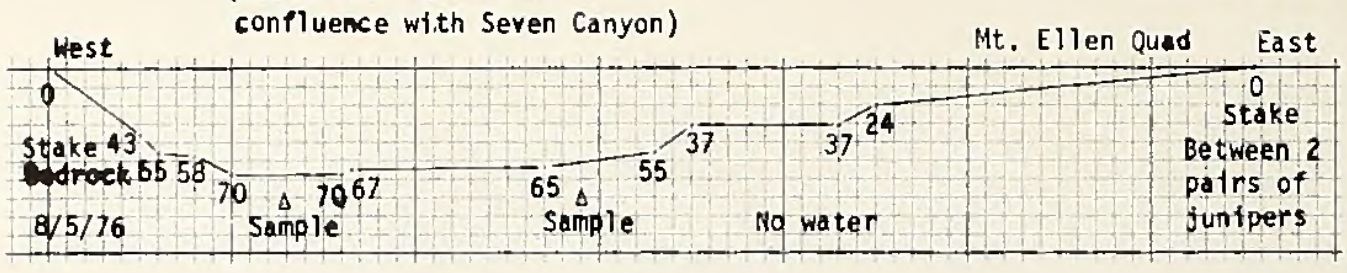
38 03 33 110 57 49



FIVE CANYON SITE 10
(About 100 ft. above confluence with Seven Canyon)

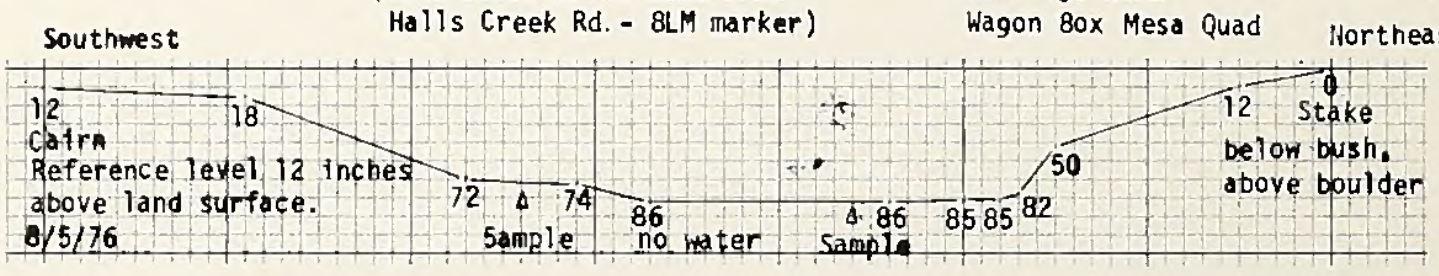
65½ ft

38 03 27 110 57 58



OIVIDE CANYON SITE 11
(Take stock trail east from Halls Creek Rd. - BLM marker)

70 ft
Bearing: N37E 37 58 31 111 03 32
Wagon Box Mesa Quad

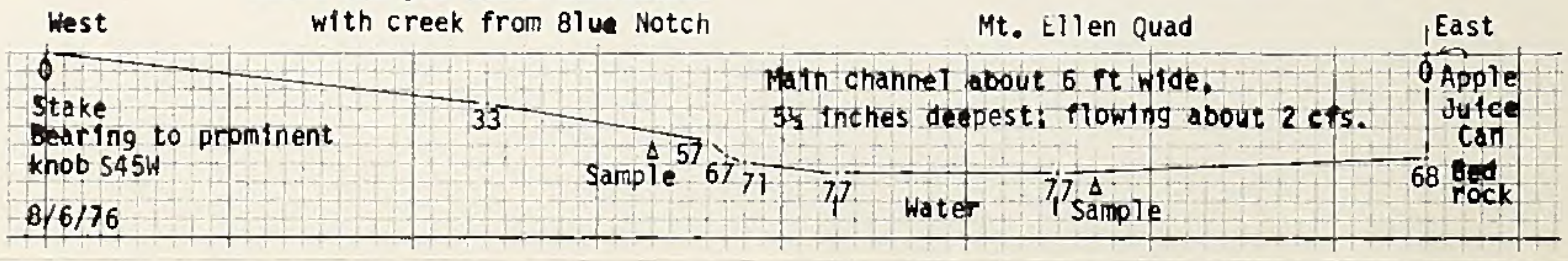


SWEETWATER CREEK SITE 12
About 200 yds above confluence with creek from Blue Notch

75 ft

38 10 12 110 59 07

Mt. Ellen Quad

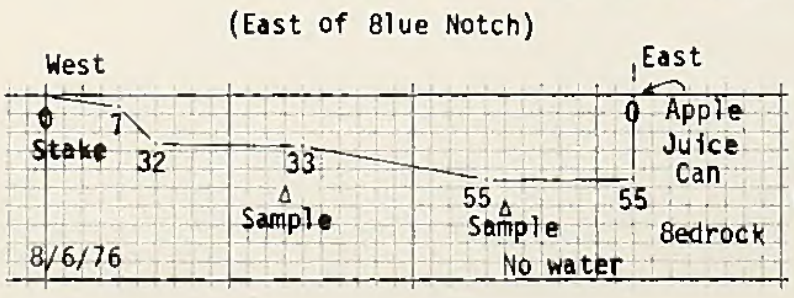


CREEK NORTH FROM WILOCAT MESA SITE 13
(East of Blue Notch)

32 ft

38 09 28 110 59 59

Mt. Ellen Quad



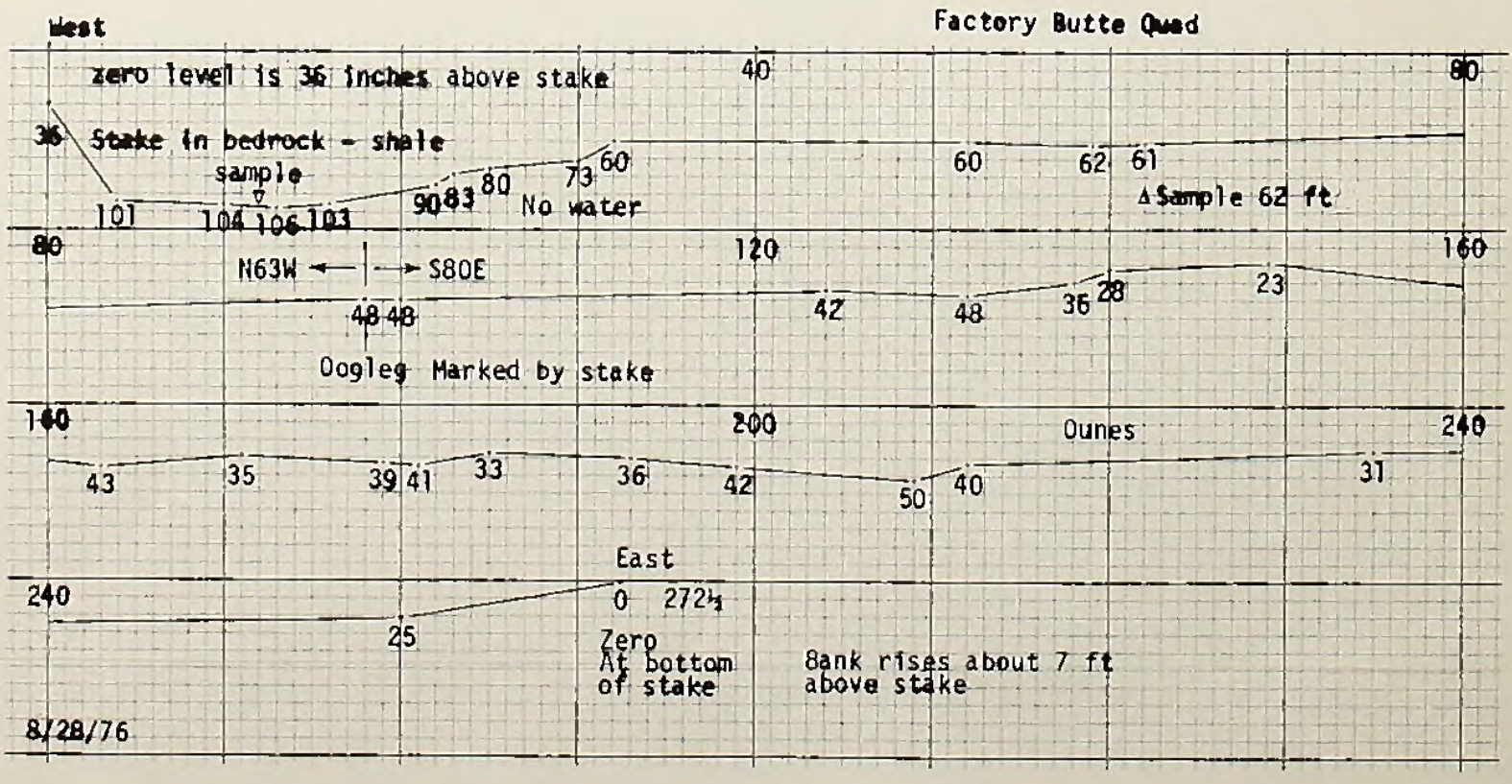
About 100 ft upstream from confluence with cow trail (creek) from Blue Notch

SWEETWATER CREEK SITE 14

272½

38 19 08 110 54 24

Factory Butte Quad



SPRING CREEK SITE 16

57½

Bearing N53W 38 02 00 110 02 24

Notom Quad

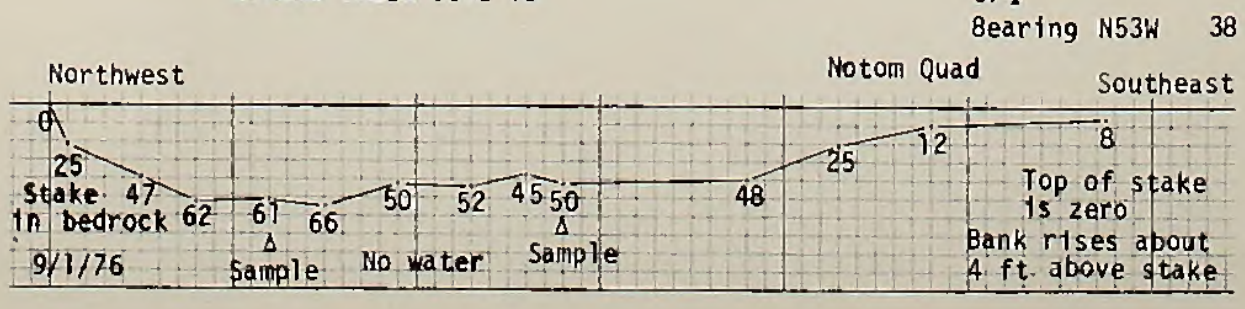


Figure 7A CROSS-CHANNEL PROFILES OF SELECTED STREAMS THAT DRAIN NORTHWARD FROM COAL BASIN -- HENRY MOUNTAINS AREA. (All sections looking downstream. Sample locations shown by Δ. Numbers below points are distances in inches below level reference line. Vertical and horizontal scales: 1 inch = 10 feet.)

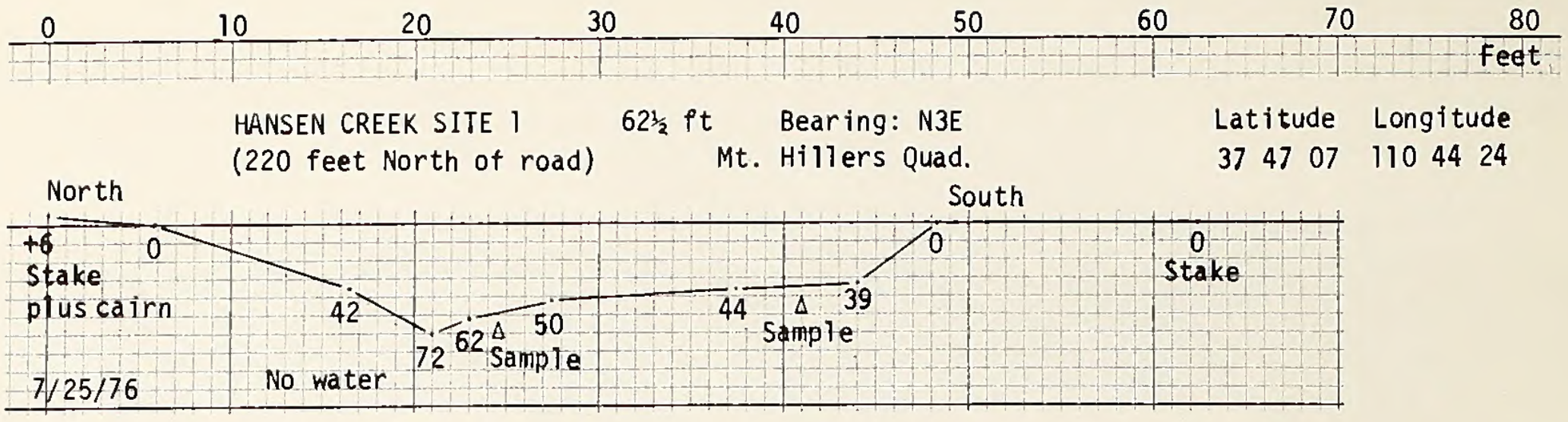


Figure 7B CROSS-CHANNEL PROFILES OF SELECTED STREAMS THAT DRAIN SOUTHWARD FROM COAL BASIN -- HENRY MOUNTAINS AREA. (All sections looking downstream. Sample locations shown by Δ. Numbers below points are are distances in inches below level reference line. Vertical and horizontal scales: 1 inch = 10 feet.)

APPENDIX E

Grain-size analyses, and bulk density and porosity determinations of surface samples from selected sandstones.

Grain-size analyses

Portions of ten samples of Emery, Ferron, Morrison, Entrada, and Navajo sandstones collected from surface outcrops were crushed in mortar and pestle and run through a set of U.S. Standard sieves. Size 10 retains very fine gravel; 18, very coarse sand; 35, coarse sand; 60, medium sand; 120, fine sand; 230, very fine sand; and <230, silt and clay. Each size fraction was then weighed and examined under a microscope to determine if the fractions consisted of discrete grains or aggregates. This fact was noted and a second sample of each rock was crushed to eliminate aggregates and sieved. The table shows the results of the analyses.

All samples consist largely of fine sand and very fine sand. Two samples of Emery are about 60 percent fine sand and 31 percent very fine sand; four samples of Ferron range from 60 to 72 percent fine sand and 14 to 24 percent very fine sand; one sample of Morrison is about 60 percent fine sand and 23 percent very fine sand; and one sample of Navajo is about 68 percent fine sand and 21 percent very fine sand. The two samples of Entrada are finer grained than the other samples: one has about 47 percent fine sand, 32 percent very fine sand, and 15 percent silt and clay; the other has about 37 percent fine sand, 49 percent very fine sand, and 13 percent silt and clay.

Bulk density and Porosity determinations

Bulk density and porosity determinations were made on portions of the same samples used for grain-sized analyses. One portion was weighed, coated with Krylon (to water proof), re-weighed, and its volume determined by immersion in cold water in a graduated beaker. From these observations, the bulk density was computed. A second sample was then weighed and its volume computed from the bulk density computation. This sample was then immersed in hot water and kept there generally overnight.

Table 8.- Grain-size analyses, and bulk density and porosity determinations of selected sandstones. Grain-size determinations in percent. (All determinations by Nancy P. Lundeen.)

	Sample Size Gms.	Sieve Sizes 10	18	35	60	120	230	<230	Bulk density gm/cc	Effective Porosity Percent
Masuk	100								2.56	6
Emery	100.00	0	.14 1/	.44 1/	1.27 1/	55.98	32.57	9.6	2.00	27
	96.75	0	.02	.03	.20	58.81	31.90	9.04		
Emery	100	0	0	.11 1/	.63 2/	58.95	30.66	9.65	1.93	26
	96.73	0	0	.01	.18	60.51	30.63	8.68		
Ferron	99.77	0	.3	.7	4.2	72.6	16.6	5.6	2.04	24
	90.91	.05	0	.03	.28	72.7	19.6	7.4		
Ferron									1.90	24
	97.41	.02	0	.09	5.05	72.95	13.6	8.3		
Ferron	100	0	0	.35 1/	6.49	61.33	20.25	11.58	1.99	25
	97.33	0	.01	.01	1.48	59.82	24.72	13.97		
Ferron	100	0	.04	.16	9.41 2/	68.54	14.09	7.76	2.04	20
	95.96	.02	.06	.17	4.62	72.86	14.77	7.50		
Morrison	100	0	.06	.27 1/	9.76 3/	57.54	23.34	9.03	2.37	16
	98.41	.01	.01	.02	5.30	61.72	23.92	9.02		
Entrada	100	.0	.05	.21 2/	7.42 2/	45.60	31.28	15.44	2.23	
	97.31	0	.01	.04	3.18	48.00	33.81	14.96		
Entrada	100.00	0	.02 1/	.27 1/	1.93 2/	35.63	48.35	13.80	2.09	18
	96.92	0	.01	.05	.29	38.32	49.25	12.08		
Navajo	100.00	0	.09 1/	.32 1/	8.03 2/	67.25	20.48	3.83	2.03	18
	96.58	0	.01	.06	2.33	69.90	22.83	4.87		

1/ Aggregates, not discrete grains

2/ Mostly aggregates

3/ About one quarter aggregates

Retains:

Sieve size 10 = very fine gravel
18 = very coarse sand
35 = coarse sand
60 = medium sand
120 = fine sand
230 = very fine sand
<230 = silt and clay

The sample was then removed from the water and reweighed along with any loose grains that had become detached from sample. The effective porosity was then computed.

Two samples of Emery Sandstone had effective porosities of 26 and 27 percent. The four samples from the Ferron gave effective porosities of 20 to 25 percent. The single sample from the Morrison had a porosity of 16 percent. The single sample from the Navajo and one sample of Entrada had porosity of 18 percent. The other sample of Entrada disintegrated in the water and no determination could be made.

A sample of Masuk Sandstone which had proved to be too well cemented to disaggregate by mortar and pestle had the highest bulk density (2.56) of any sample and the lowest effective porosity (6).

APPENDIX F

Birch Creek and its Downstream loss of Calcium Carbonate

Analyses of water samples collected in 1975 and 1976 show that Birch Creek loses a little less than half its calcium carbonate during its flow through a reach about one and a half miles long.

Birch Creek rises on the north slope of Mt. Ellen and flows nearly due north to the Fremont River. Presumably it gets its water from the Dry Lakes Springs (BC-1 and 2) and Cold Spring (BC-3). These sources were not investigated because they rise two miles or more up a steep canyon. Instead, Birch Creek was measured and sampled on July 11, 1975, at the mouth of the canyon at the end of a jeep road. Measurements made later, on July 27, 1975, showed higher flow, 100 gpm vs 75 gpm, than had been measured on July 11. Presumably, the higher flow was due to an increase in snowmelt, for the temperature on July 27 was 15°C, 2½°C colder than it had been on July 11, even though both measurements were made very close to noon.

On August 2, 1976, we remeasured Birch Creek at about 1:30 PM: flow 130 gpm, temperature 16½°C, conductance 390 (essentially the same conductance as the 385 measured in 1975). We then decided to find out where the flow disappeared into the alluvial fan below the canyon mouth, so we drove nearly two miles down the fan and then located the area of disappearance (see map of upper part of Birch Creek, figure 8). Next we chose a good measuring site about 200 yards above the disappearance and measured 24 gpm, 27°C, conductance 285. We were puzzled about the decrease in conductance (we were using two conductance meters, and therefore we could not attribute the change to meter error), so we collected a sample for analysis and then went upstream and measured temperature and conductance of Birch Creek at two intermediate sites (2 and 3 on figure 8), and collected a sample at site 2.

The temperature and conductance at the two intermediate sites and the pertinent parts of the chemical analyses of the three samples (one in 1975, 2 in 1976) are given in the table.

Figure 8. - Map of a portion of Mt. Ellen 15-minute quadrangle showing measuring sites 1, 2, 3, and 4 on Birch Creek.

Scale

0 1 2 Miles

Flow data and chemical constituents of water samples collected on Birch Creek

Date	Place	Flow gpm	Cond mmho	Temp °C	Res 180°	Ca	Cl	Hard	Mg	Si	Na	SO_3	Bicarb
7/11/75	Canyon mouth	75 M	385	18	236	64	5.1	200	8.6	19	13	56	182
8/2/76	Canyon mouth	130 M	390	16½									
8/2/76	Half Mile below mouth	60 E	330	22	208	45	5.3	150	9.4	17	13	58	140
8/2/76	One Mile below mouth	40 E	300	25									
8/2/76	1½ miles below mouth	24 M	285	27	183	33	5.4	120	8.3	18	13	59	104

This table clearly shows the downstream rise in temperature, which would be expected on a bright, sunny day in early August, and the downstream lowering of conductance and dissolved solids. Probably CO_2 is released from the water, perhaps O^2 is added. At any rate, $CaCO_3$ is removed from the water and the water becomes appreciably softer. The content of the other ions remains essentially the same; the amount of Mg as recorded in the middle sample seems anomalous when compared to the other two samples, but it doesn't affect the overall conclusion that the water loses $CaCO_3$ as it moves downstream.

Benchmark
ITEM 240-K 9½×14½

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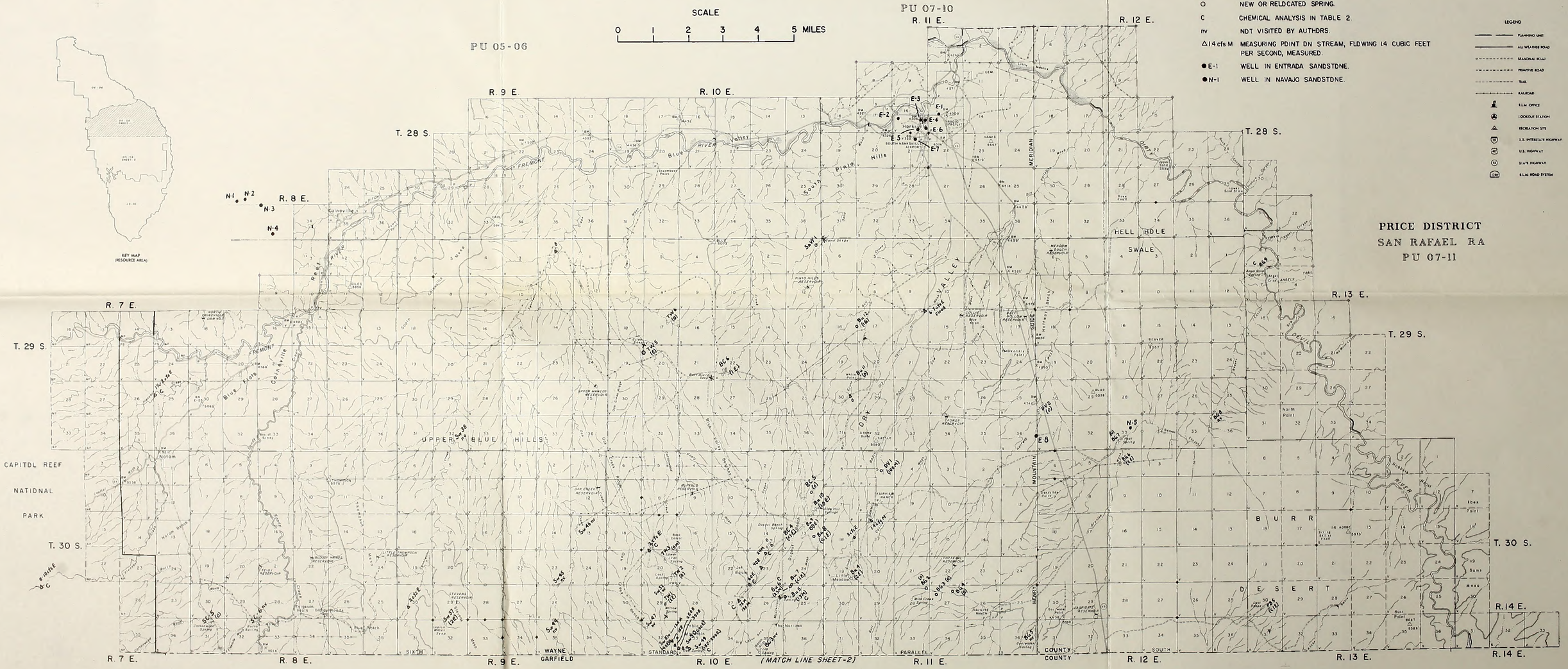
Figure 6. MAP SHOWING LOCATIONS OF SPRINGS, MEASURING POINTS ON SELECTED STREAMS, AND SELECTED WELLS, HENRY MOUNTAINS AREA, UTAH.



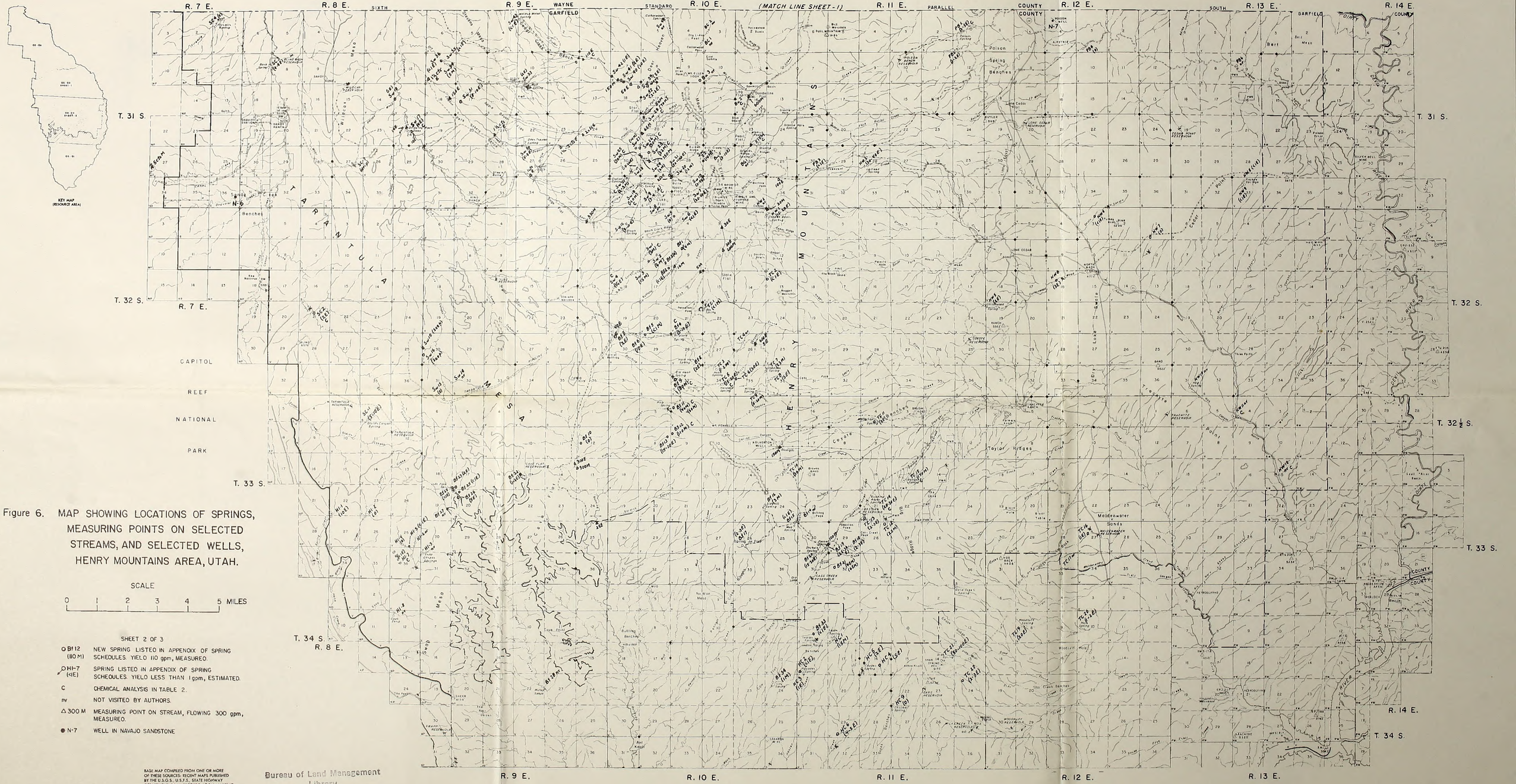


Figure 6. MAP SHOWING LOCATIONS OF SPRINGS, MEASURING POINTS ON SELECTED STREAMS, AND SELECTED WELLS, HENRY MOUNTAINS AREA, UTAH.

SHEET 2 OF 3

○ BI-12 (110 M)	NEW SPRING LISTED IN APPENDIX OF SPRING SCHEDULES. YIELD 110 gpm, MEASURED.
○ HI-7 (<1E)	SPRING LISTED IN APPENDIX OF SPRING SCHEDULES. YIELD LESS THAN 1 gpm, ESTIMATED.
C	CHEMICAL ANALYSIS IN TABLE 2.
nv	NOT VISITED BY AUTHORS.
△ 300 M	MEASURING POINT ON STREAM, FLOWING 300 gpm, MEASURED.
● N-7	WELL IN NAVAJO SANDSTONE

BASE MAP COMPILED FROM ONE OR MORE OF THESE SOURCES: RECENT MAPS PUBLISHED BY THE U.S.G.S., U.S.F.S., STATE HIGHWAY DEPARTMENT, B.L.M. RECORDS, LOCAL MAPPING SOURCES AND AERIAL PHOTOGRAPHY.

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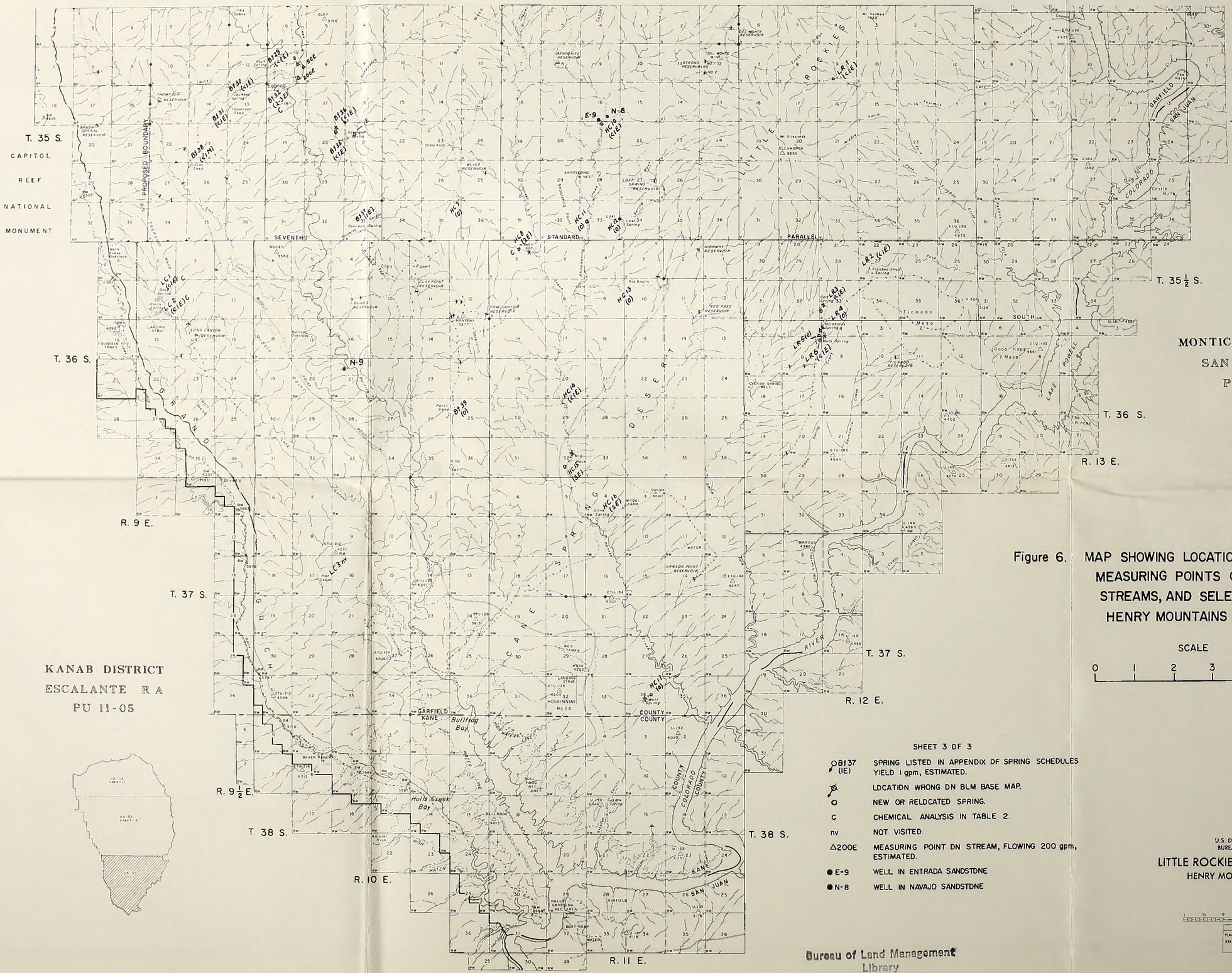

MONTICELLO DISTRICT
SAN JUAN R A
PU 06-08

KANAB DISTRICT
ESCALANTE R A
PU 11-05

Figure 6. MAP SHOWING LOCATIONS OF SPRINGS, MEASURING POINTS ON SELECTED STREAMS, AND SELECTED WELLS, HENRY MOUNTAINS AREA, UTAH.

SCALE
0 1 2 3 4 5 MILES

SHEET 3 OF 3

BI 37 (1E)	SPRING LISTED IN APPENDIX OF SPRING SCHEDULES YIELD 1 gpm, ESTIMATED.
	LOCATION WRONG ON BLM BASE MAP.
	NEW OR RELOCATED SPRING.
C	CHEMICAL ANALYSIS IN TABLE 2.
nv	NOT VISITED.
△200E	MEASURING POINT ON STREAM, FLOWING 200 gpm, ESTIMATED.
● E-9	WELL IN ENTRADA SANDSTONE
● N-8	WELL IN NAVAJO SANDSTONE

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